FIG. 1

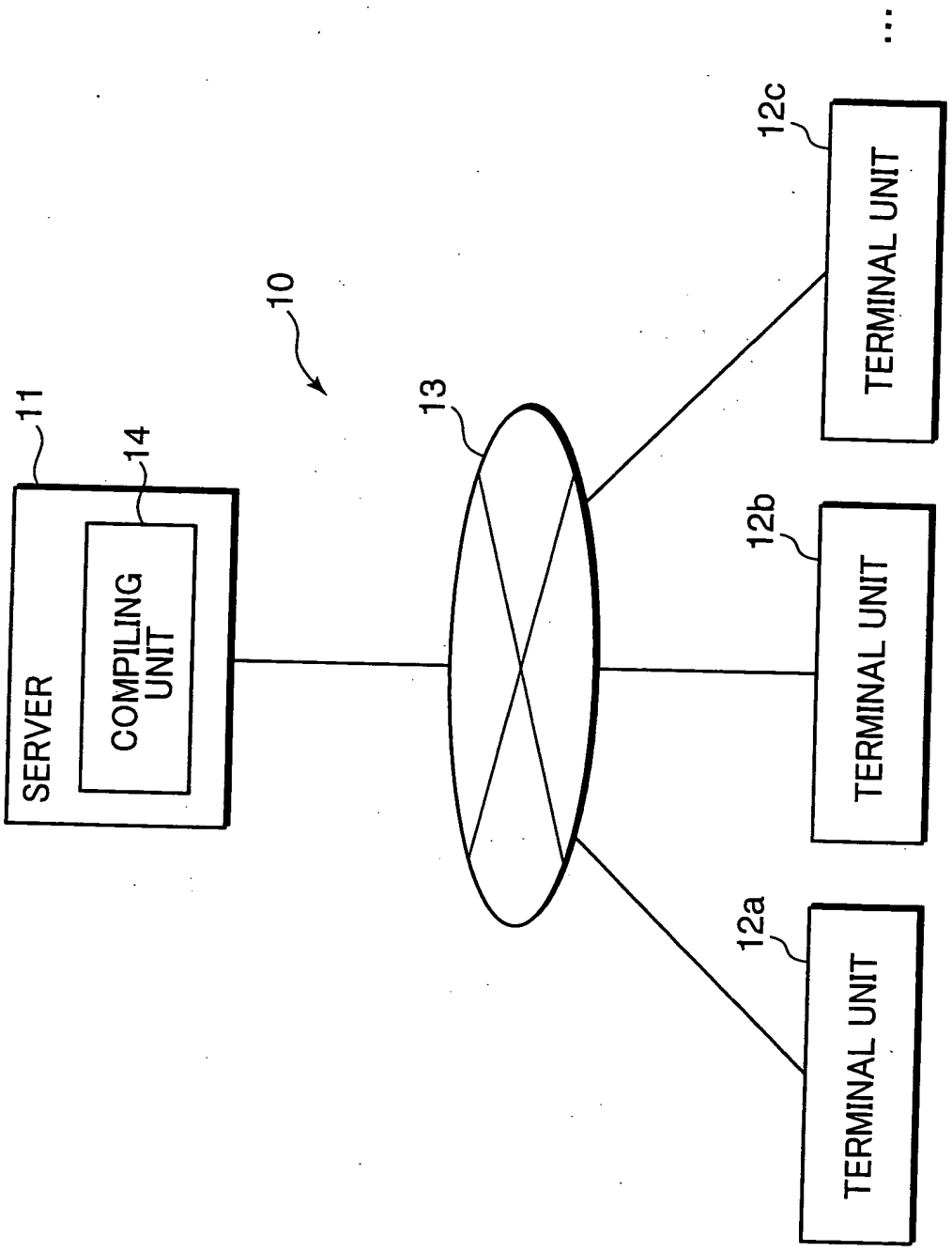
10
11
14
SERVER
COMPILING UNIT
13
12c
TERMINAL UNIT
12b
TERMINAL UNIT
12a
TERMINAL UNIT
...

FIG. 2

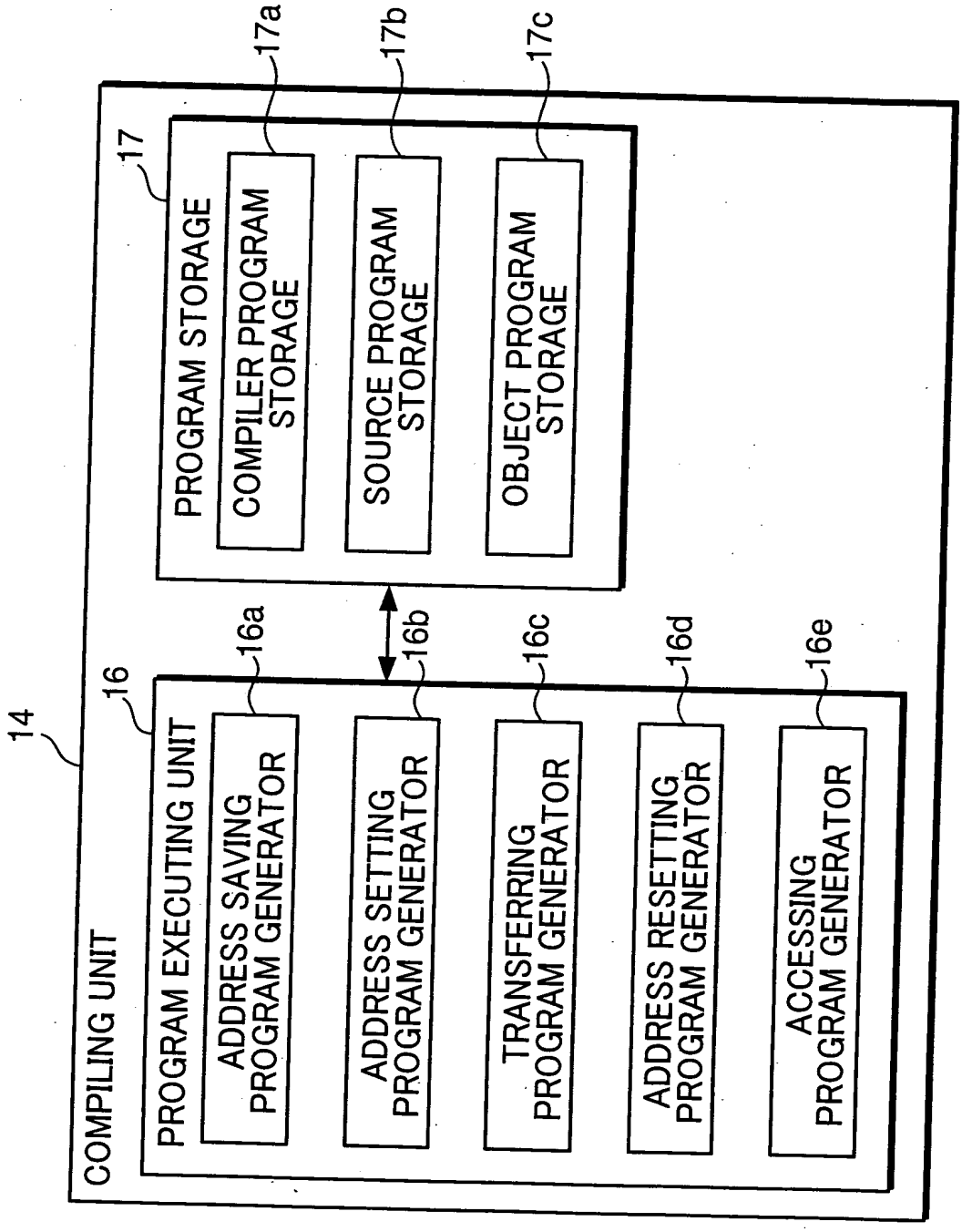
14
COMPILING UNIT
16
PROGRAM EXECUTING UNIT
ADDRESS SAVING PROGRAM GENERATOR
16a
ADDRESS SETTING PROGRAM GENERATOR
16b
TRANSFERRING PROGRAM GENERATOR
16c
ADDRESS RESETTING PROGRAM GENERATOR
16d
ACCESSING PROGRAM GENERATOR
16e
17
PROGRAM STORAGE
COMPILER PROGRAM STORAGE
17a
SOURCE PROGRAM STORAGE
17b
OBJECT PROGRAM STORAGE
17c

FIG. 3

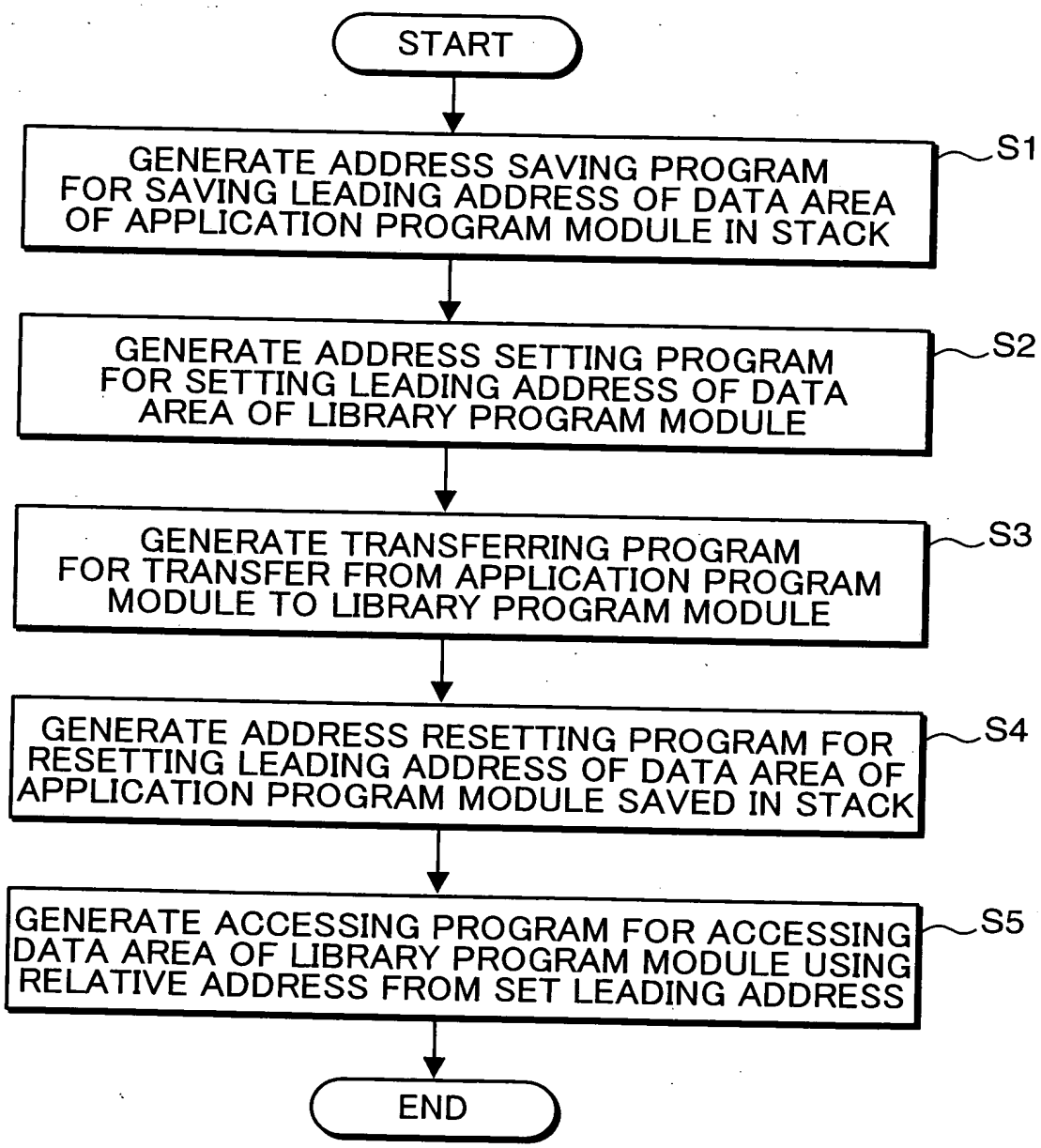
START
GENERATE ADDRESS SAVING PROGRAM FOR SAVING LEADING ADDRESS OF DATA AREA OF APPLICATION PROGRAM MODULE IN STACK
S1
GENERATE ADDRESS SETTING PROGRAM FOR SETTING LEADING ADDRESS OF DATA AREA OF LIBRARY PROGRAM MODULE
S2
GENERATE TRANSFERRING PROGRAM FOR TRANSFER FROM APPLICATION PROGRAM MODULE TO LIBRARY PROGRAM MODULE
S3
GENERATE ADDRESS RESETTING PROGRAM FOR RESETTING LEADING ADDRESS OF DATA AREA OF APPLICATION PROGRAM MODULE SAVED IN STACK
S4
GENERATE ACCESSING PROGRAM FOR ACCESSING DATA AREA OF LIBRARY PROGRAM MODULE USING RELATIVE ADDRESS FROM SET LEADING ADDRESS
S5
END

FIG. 4A

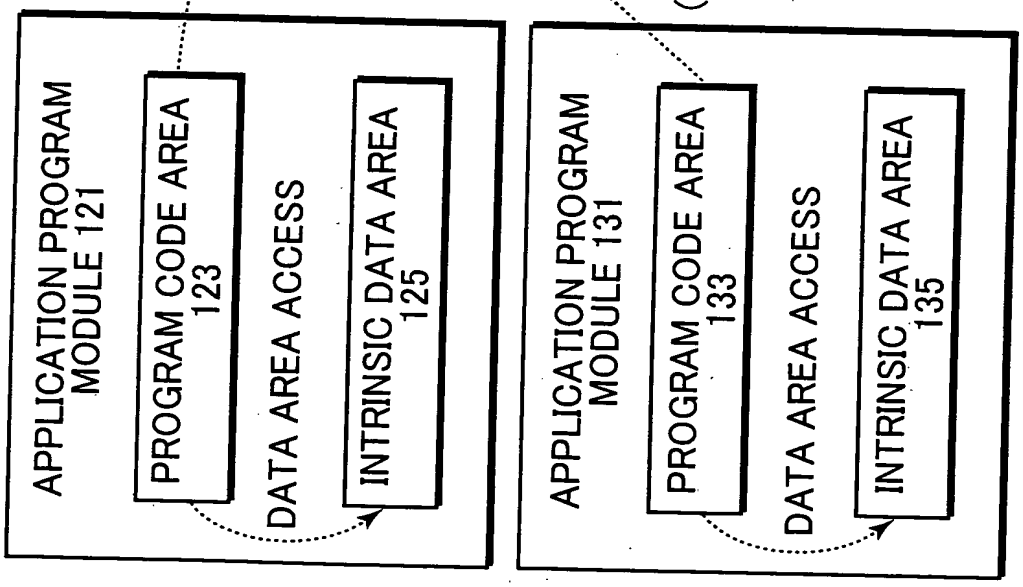
APPLICATION PROGRAM MODULE 121
PROGRAM CODE AREA 123
DATA AREA ACCESS
INTRINSIC DATA AREA 125
APPLICATION PROGRAM MODULE 131
PROGRAM CODE AREA 133
DATA AREA ACCESS
INTRINSIC DATA AREA 135
PROGRAM CALL 1
PROGRAM CALL 2 (REENTRANT)

FIG. 4B

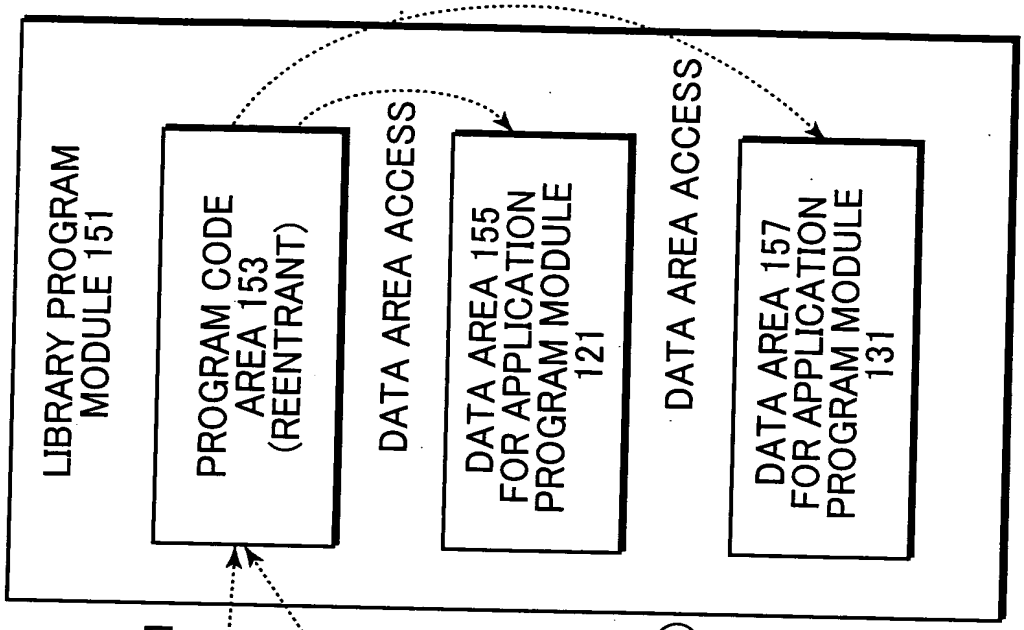
LIBRARY PROGRAM MODULE 151
PROGRAM CODE AREA 153 (REENTRANT)
DATA AREA ACCESS
DATA AREA 155 FOR APPLICATION PROGRAM MODULE 121
DATA AREA ACCESS
DATA AREA 157 FOR APPLICATION PROGRAM MODULE 131

FIG. 5

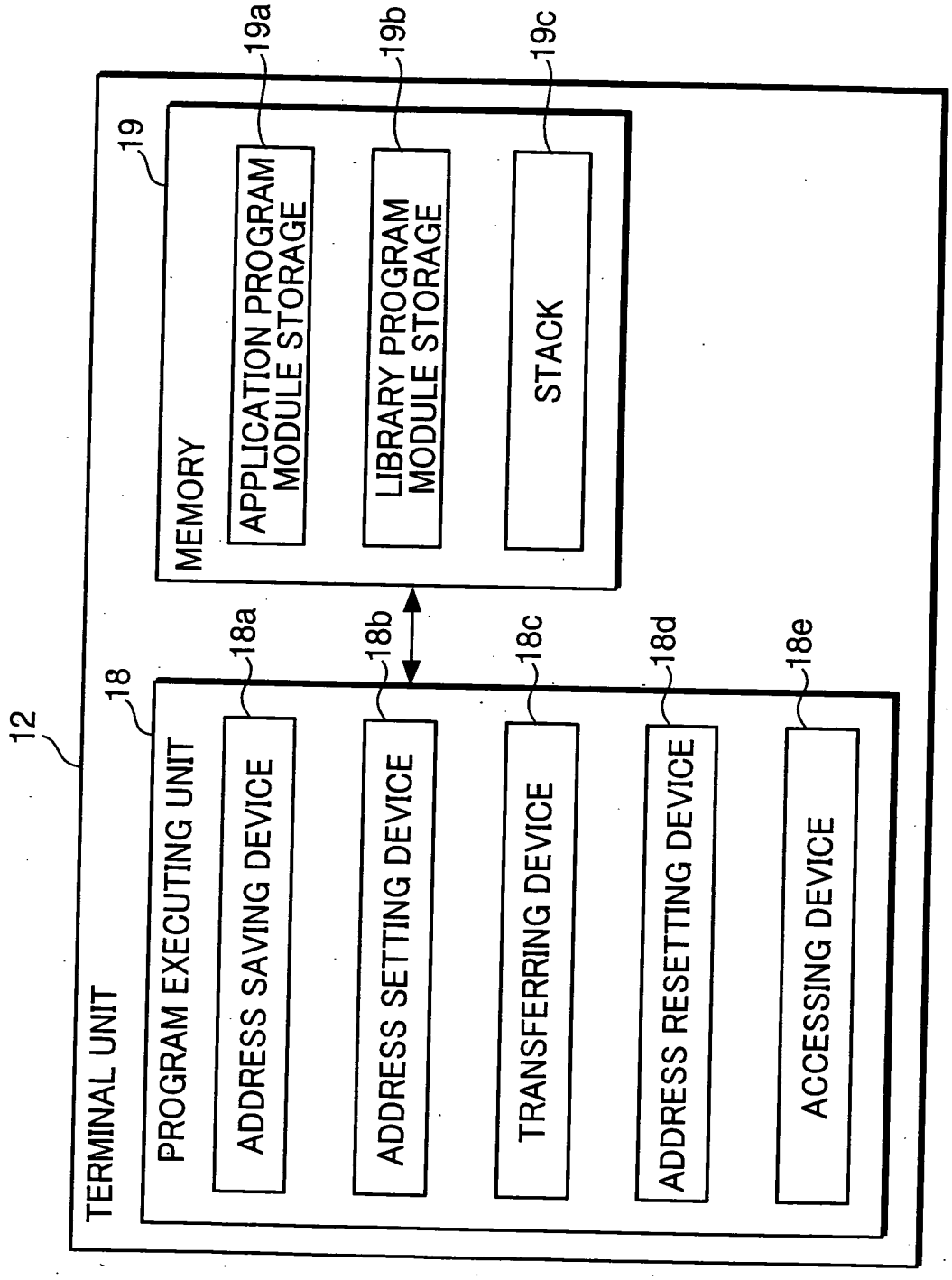
12
TERMINAL UNIT
18
PROGRAM EXECUTING UNIT
18a
ADDRESS SAVING DEVICE
18b
ADDRESS SETTING DEVICE
18c
TRANSFERRING DEVICE
18d
ADDRESS RESETTING DEVICE
18e
ACCESSING DEVICE
19
MEMORY
19a
APPLICATION PROGRAM MODULE STORAGE
19b
LIBRARY PROGRAM MODULE STORAGE
19c
STACK

FIG. 6

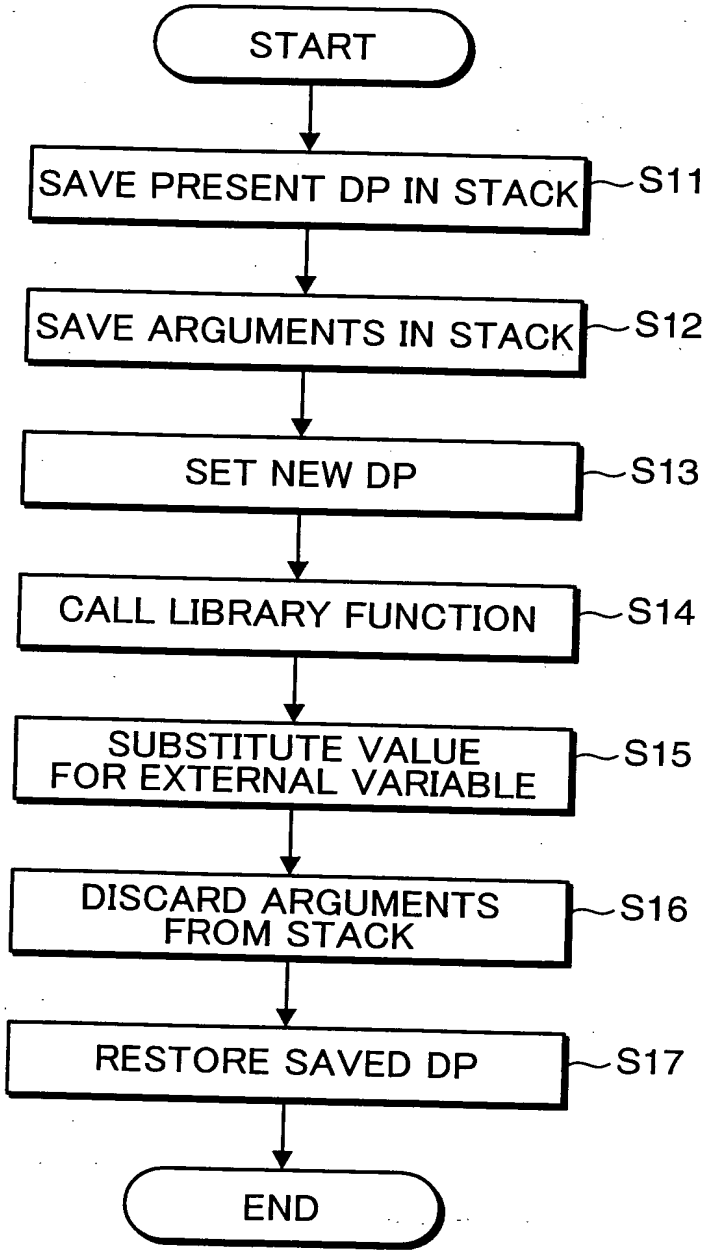
START
SAVE PRESENT DP IN STACK
S11
SAVE ARGUMENTS IN STACK
S12
SET NEW DP
S13
CALL LIBRARY FUNCTION
S14
SUBSTITUTE VALUE FOR EXTERNAL VARIABLE
S15
DISCARD ARGUMENTS FROM STACK
S16
RESTORE SAVED DP
S17
END

FIG. 7A

FIG. 7B

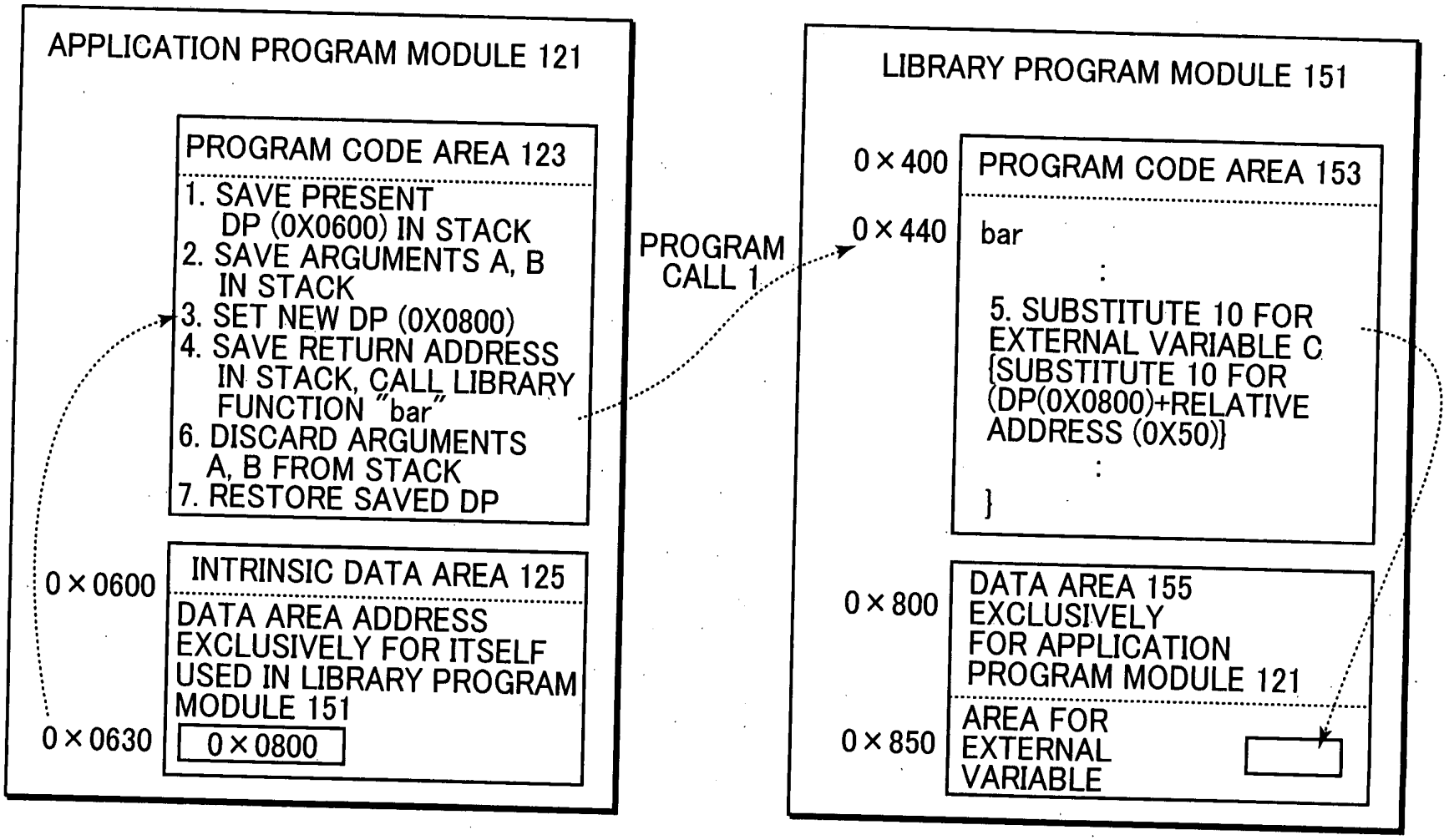

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FIG. 8A

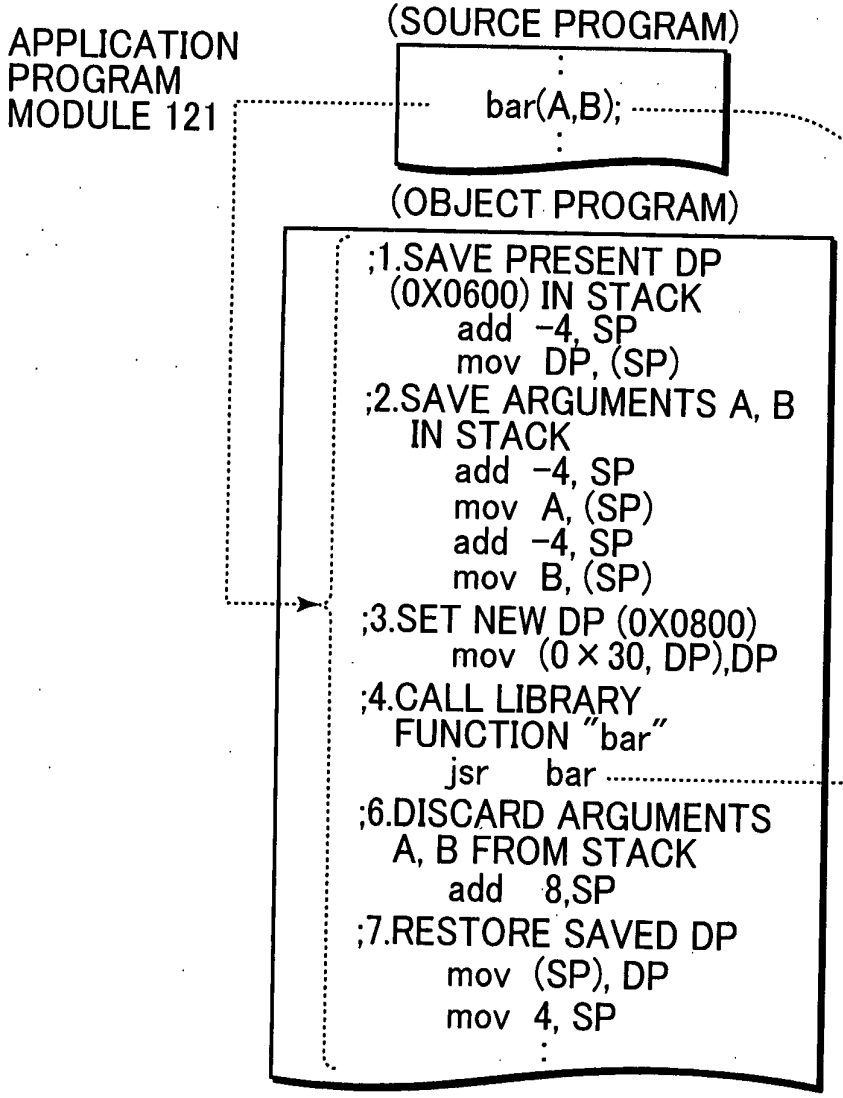
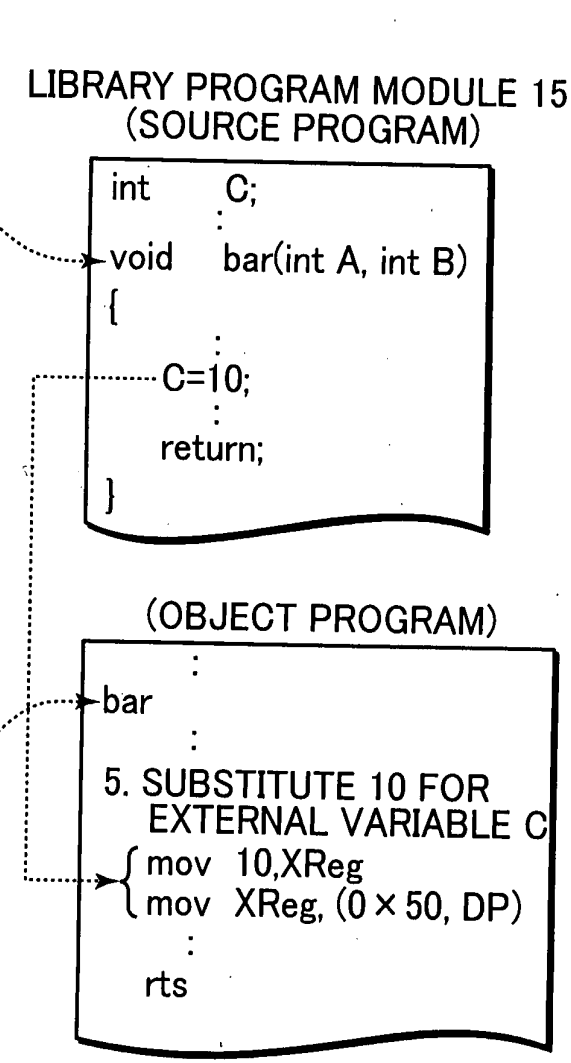


FIG. 8B



10/541458

FIG. 9A

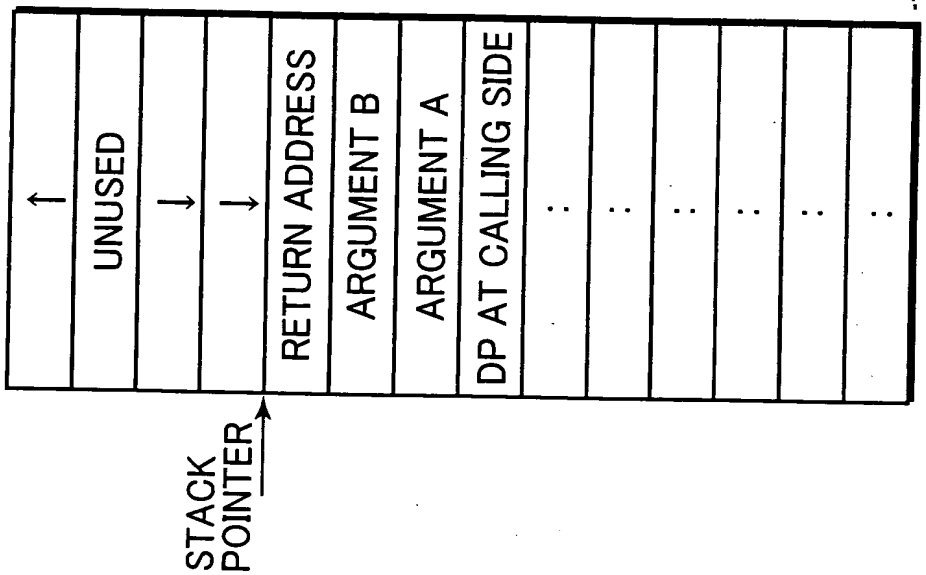

STACK MEMORY
(LAST-IN FIRST-OUT)
STACK POINTER
↑
UNUSED
↓
↓
RETURN ADDRESS
ARGUMENT B
ARGUMENT A
DP AT CALLING SIDE

FIG. 9B

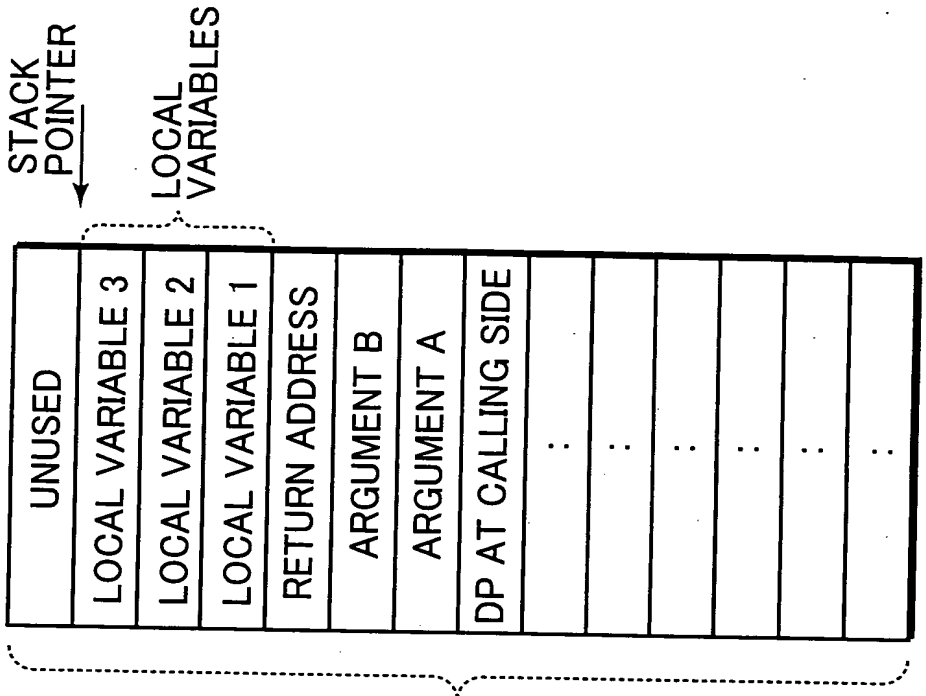

STACK POINTER
LOCAL VARIABLES
UNUSED
LOCAL VARIABLE 3
LOCAL VARIABLE 2
LOCAL VARIABLE 1
RETURN ADDRESS
ARGUMENT B
ARGUMENT A
DP AT CALLING SIDE

FIG. 10A

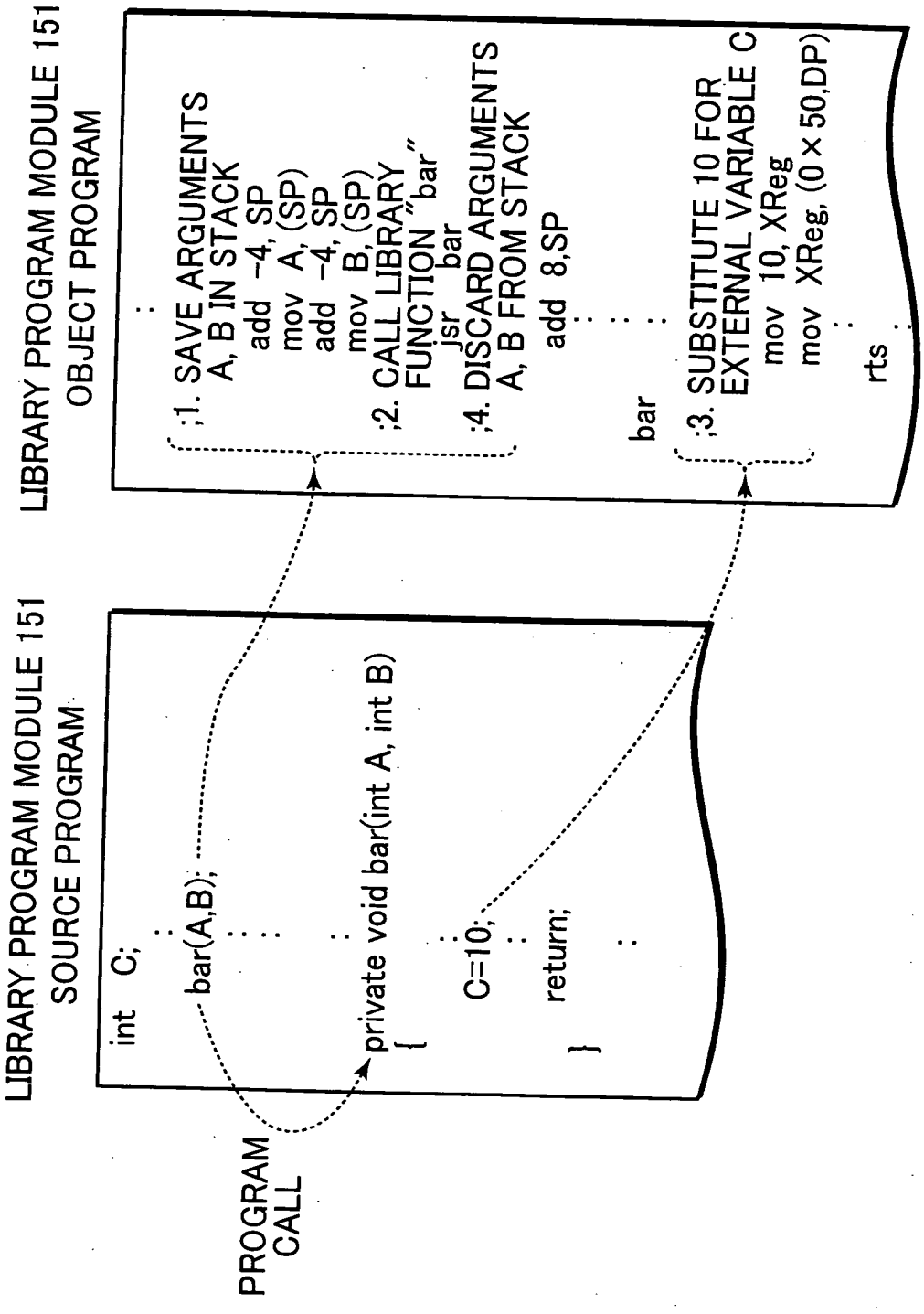


FIG. 10B

FIG. 11

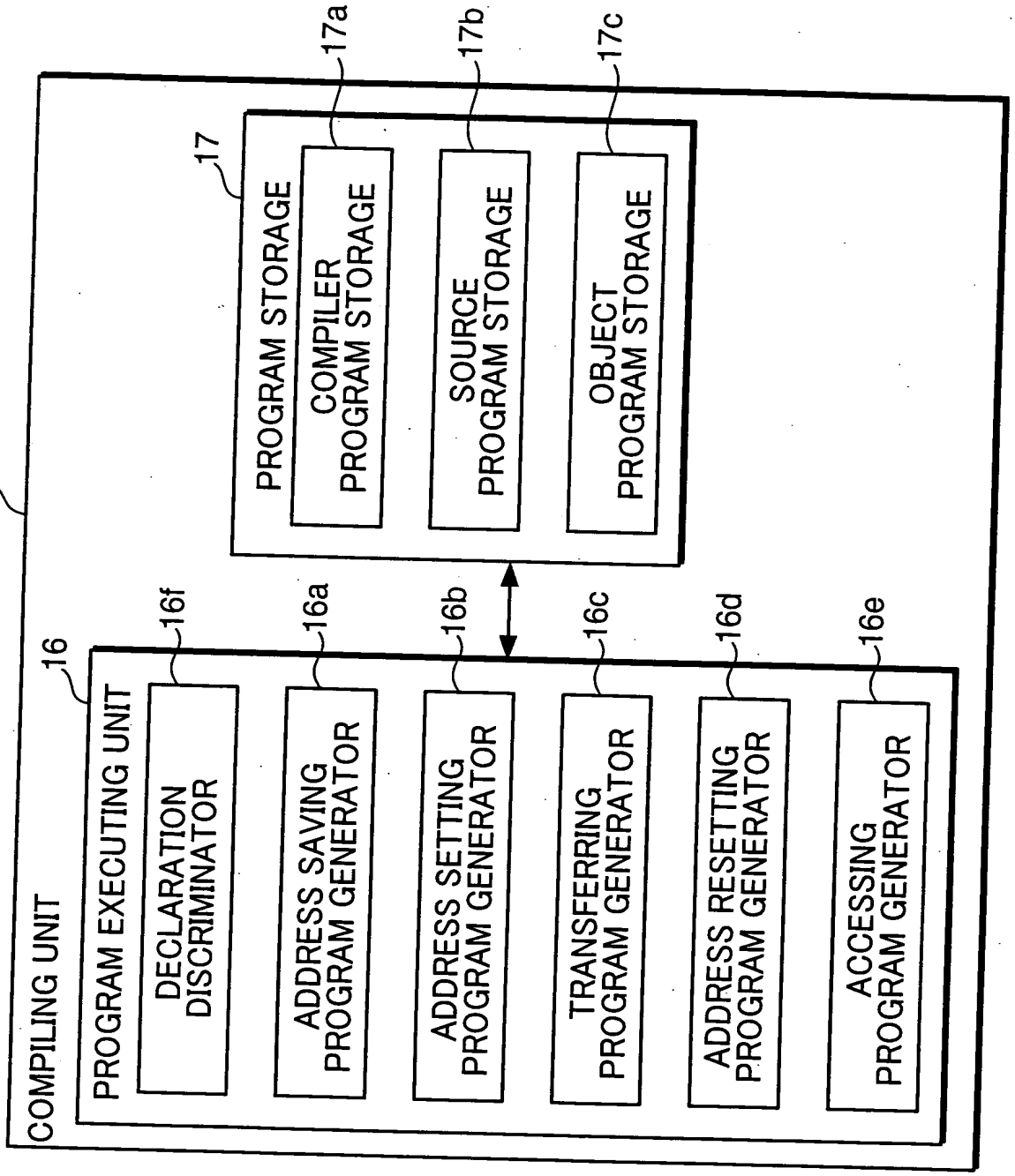

14
COMPILING UNIT
16
PROGRAM EXECUTING UNIT
16f
DECLARATION DISCRIMINATOR
16a
ADDRESS SAVING PROGRAM GENERATOR
16b
ADDRESS SETTING PROGRAM GENERATOR
16c
TRANSFERRING PROGRAM GENERATOR
16d
ADDRESS RESETTING PROGRAM GENERATOR
16e
ACCESSING PROGRAM GENERATOR
17
PROGRAM STORAGE
17a
COMPILER PROGRAM STORAGE
17b
SOURCE PROGRAM STORAGE
17c
OBJECT PROGRAM STORAGE

FIG. 12

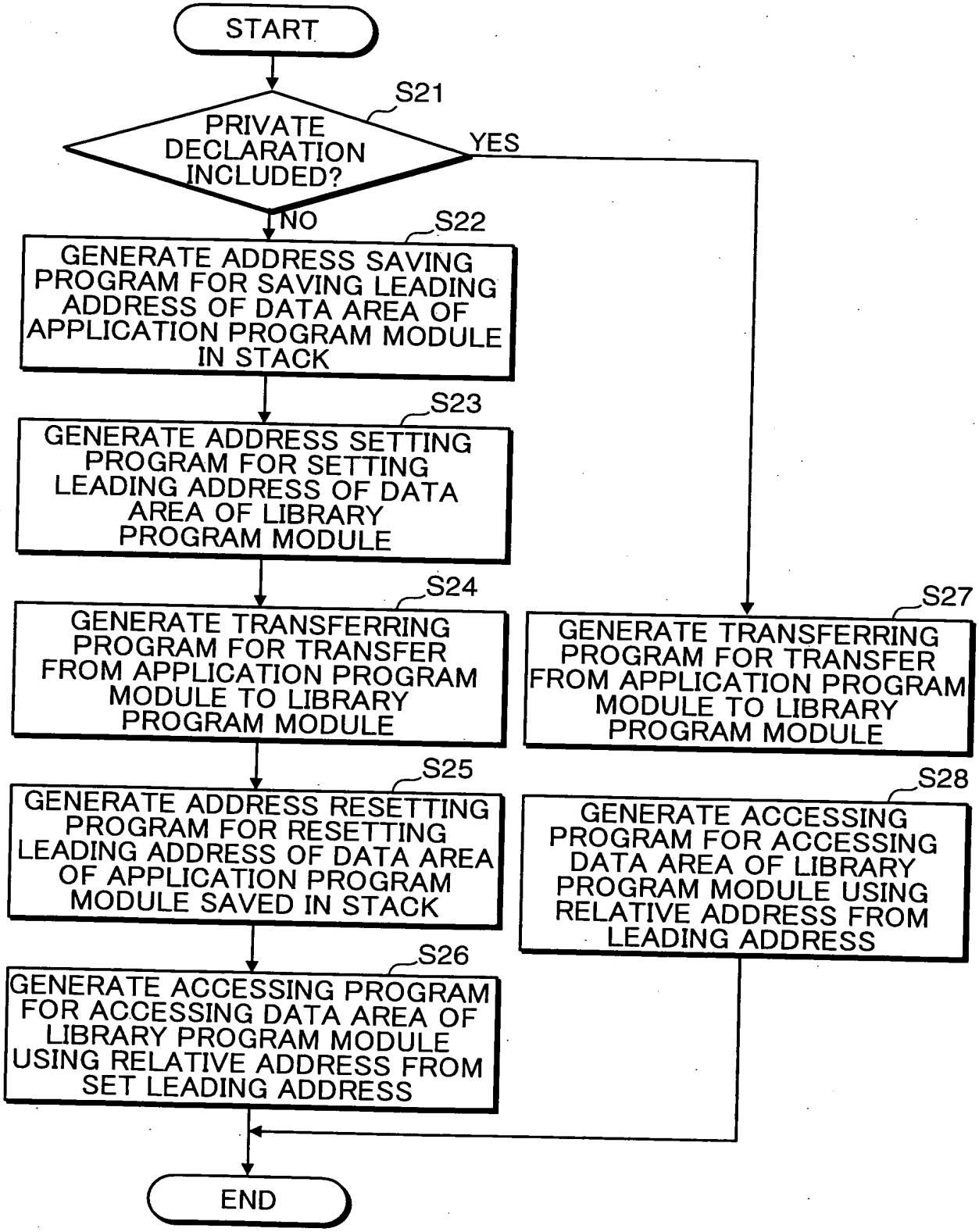

START
S21
PRIVATE DECLARATION INCLUDED?
YES
NO
S22
GENERATE ADDRESS SAVING PROGRAM FOR SAVING LEADING ADDRESS OF DATA AREA OF APPLICATION PROGRAM MODULE IN STACK
S23
GENERATE ADDRESS SETTING PROGRAM FOR SETTING LEADING ADDRESS OF DATA AREA OF LIBRARY PROGRAM MODULE
S24
GENERATE TRANSFERRING PROGRAM FOR TRANSFER FROM APPLICATION PROGRAM MODULE TO LIBRARY PROGRAM MODULE
S25
GENERATE ADDRESS RESETTING PROGRAM FOR RESETTING LEADING ADDRESS OF DATA AREA OF APPLICATION PROGRAM MODULE SAVED IN STACK
S26
GENERATE ACCESSING PROGRAM FOR ACCESSING DATA AREA OF LIBRARY PROGRAM MODULE USING RELATIVE ADDRESS FROM SET LEADING ADDRESS
S27
GENERATE TRANSFERRING PROGRAM FOR TRANSFER FROM APPLICATION PROGRAM MODULE TO LIBRARY PROGRAM MODULE
S28
GENERATE ACCESSING PROGRAM FOR ACCESSING DATA AREA OF LIBRARY PROGRAM MODULE USING RELATIVE ADDRESS FROM LEADING ADDRESS
END

FIG. 13

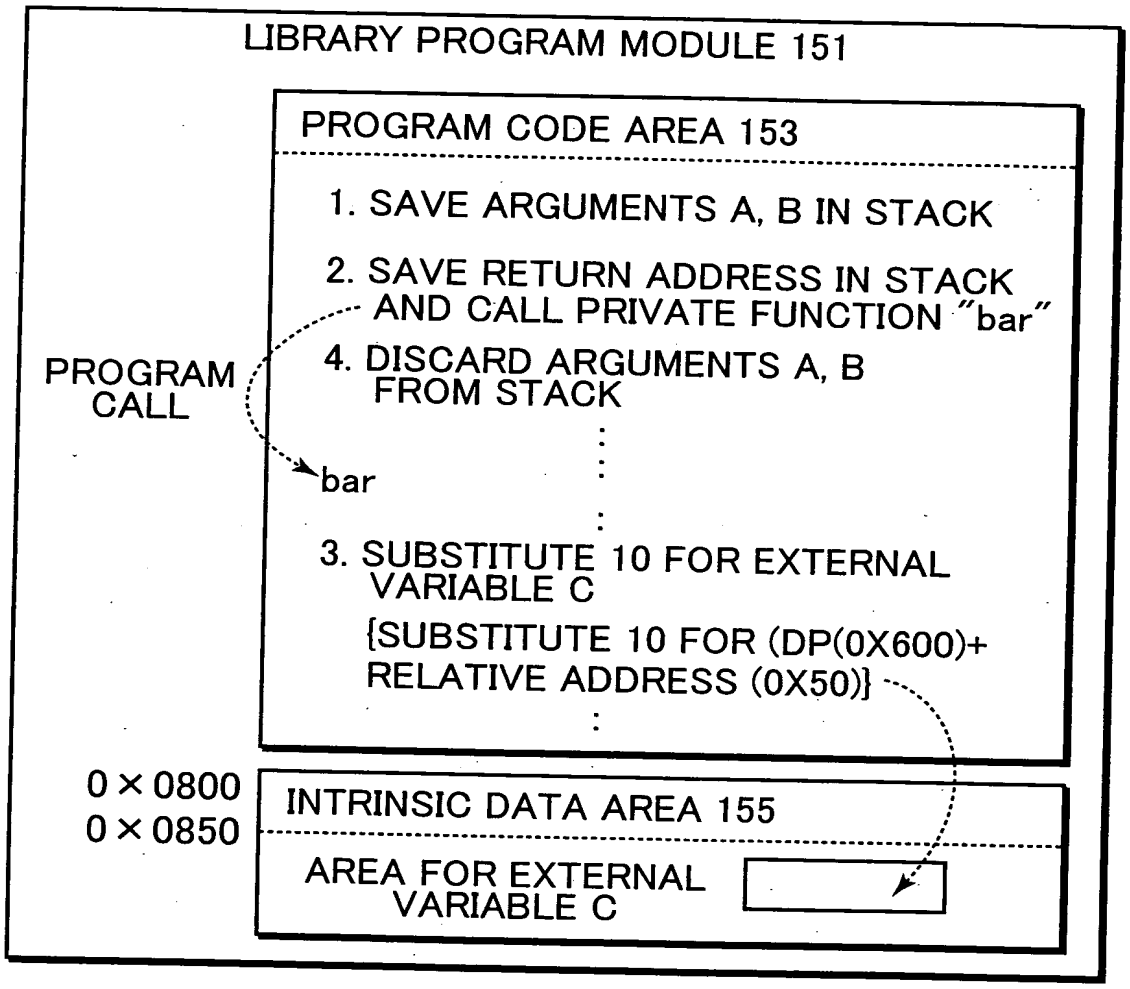

LIBRARY PROGRAM MODULE 151
PROGRAM CODE AREA 153
1. SAVE ARGUMENTS A, B IN STACK
2. SAVE RETURN ADDRESS IN STACK AND CALL PRIVATE FUNCTION "bar"
4. DISCARD ARGUMENTS A, B FROM STACK
PROGRAM CALL
bar
3. SUBSTITUTE 10 FOR EXTERNAL VARIABLE C
{SUBSTITUTE 10 FOR (DP(0X600)+ RELATIVE ADDRESS (0X50)}
0×0800
0×0850
INTRINSIC DATA AREA 155
AREA FOR EXTERNAL VARIABLE C

FIG. 14A

LIBRARY PROGRAM MODULE 551
(SOURCE PROGRAM)

```
        :
  int   C;
  common  int   D;
  void  bar(int  A,   int  B)
  {
        :
/ * SUBSTITUTE 10 FOR
EXTERNAL VARIABLE C * /
      C=10;
/ * SUBSTITUTE 20 FOR
EXTERNAL VARIABLE D * /
      D=20;
        :
      return;
  {
        :
```

FIG. 14B

LIBRARY PROGRAM MODULE 551
(OBJECT PROGRAM)

```
        :
  bar
        :
; SUBSTITUTE 10 FOR EXTERNAL
  VARIABLE C
      mov   10,  XReg
      mov   XReg,  (0 × 50, DP)
; SUBSTITUTE 20 FOR EXTERNAL
  VARIABLE D
      mov   20,  XReg
      mov   XReg,  (0 × 60, SDP)
        :
      rts
        :
```


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FIG. 15A

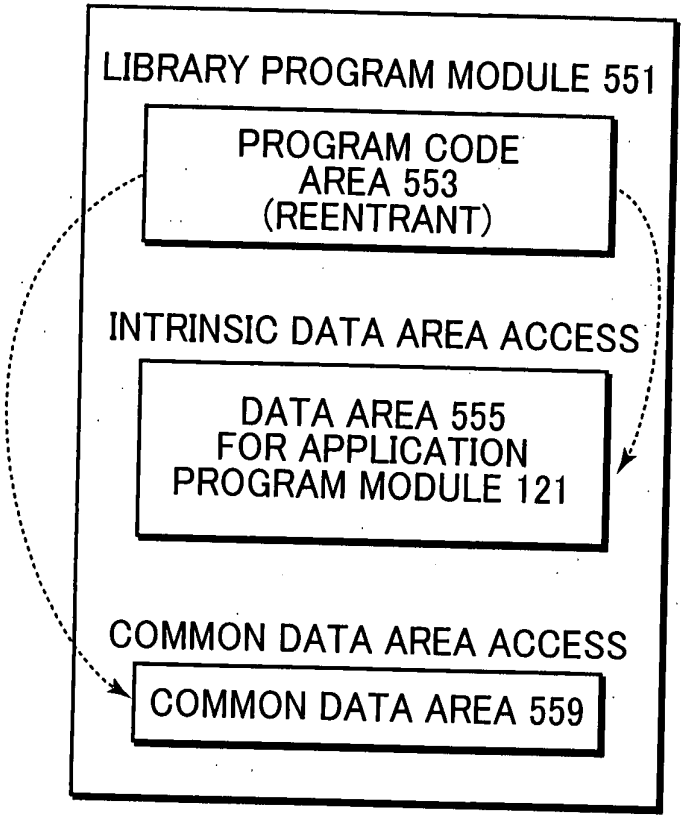
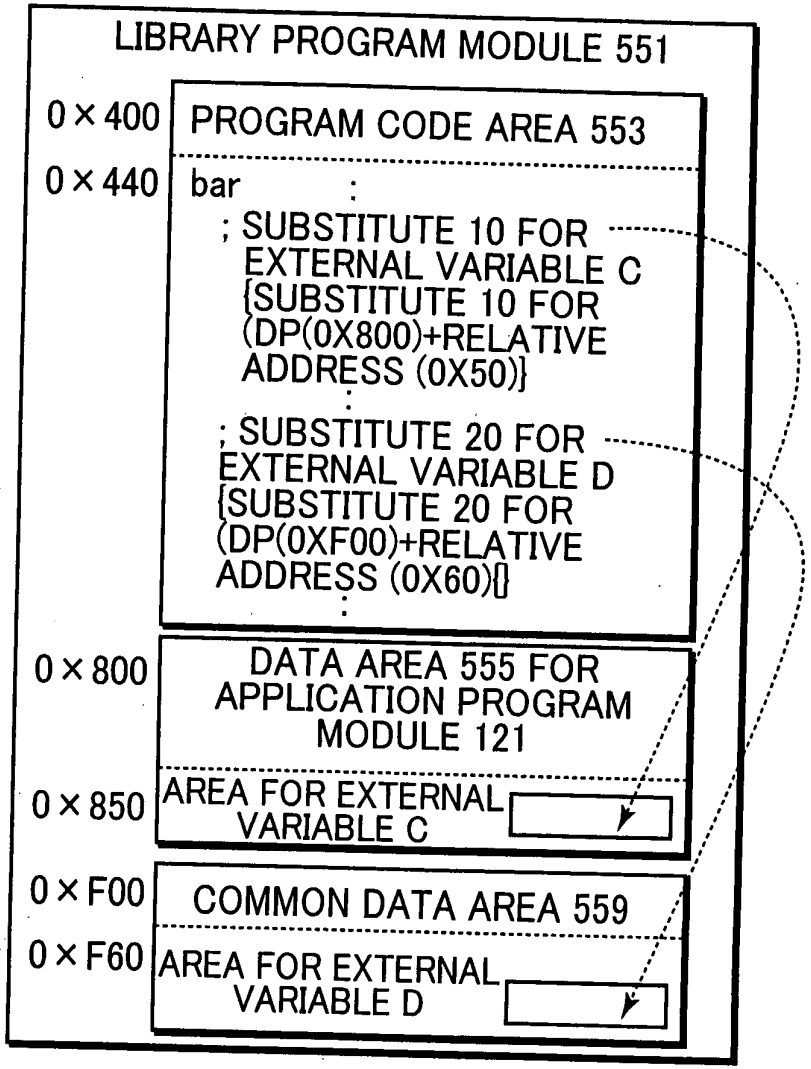


FIG. 15B



10/541458

FIG. 16A

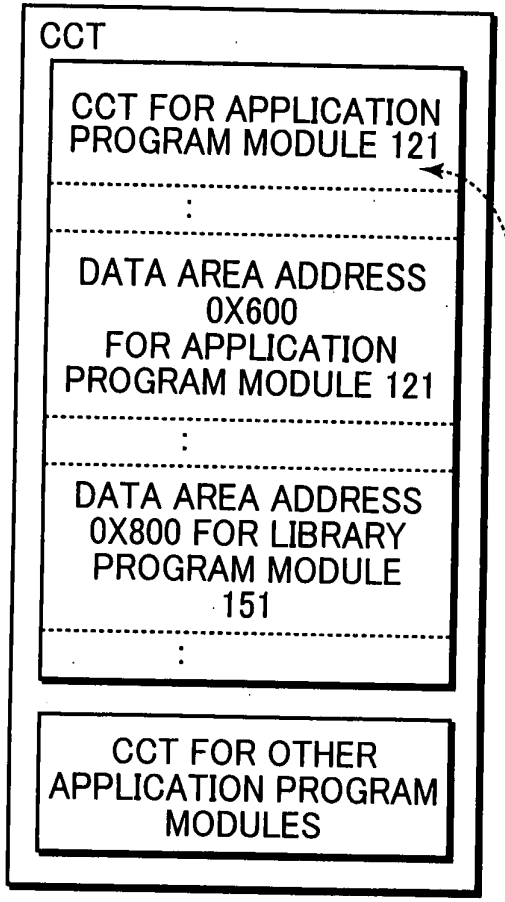


FIG. 16B

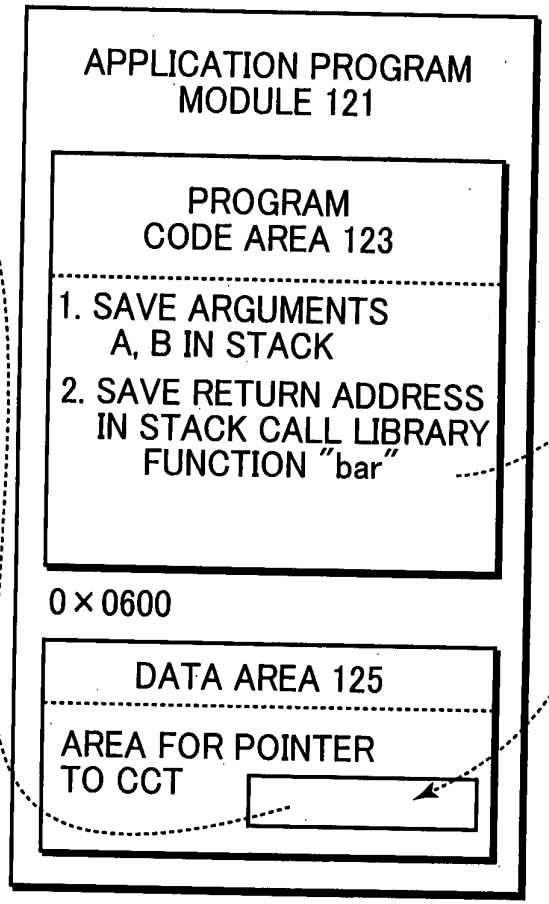


FIG. 16C

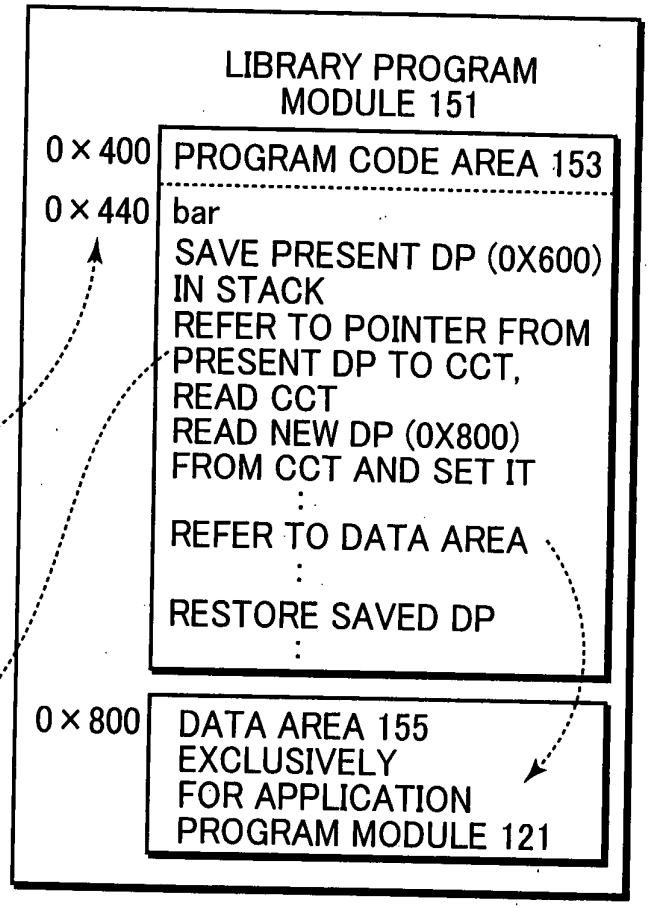


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FIG. 17

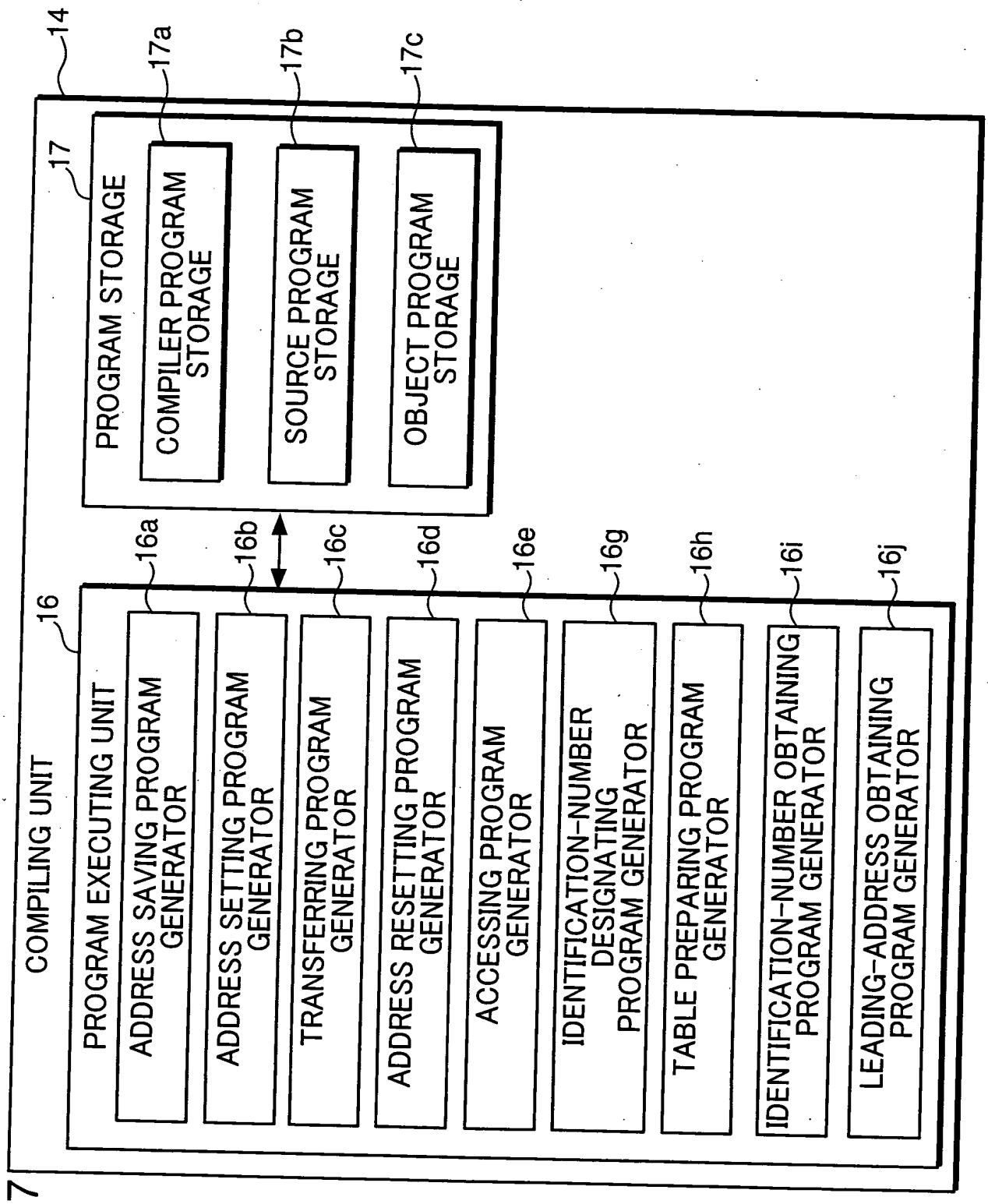

14
17a
17b
17c
17
PROGRAM STORAGE
COMPILER PROGRAM STORAGE
SOURCE PROGRAM STORAGE
OBJECT PROGRAM STORAGE
16a
16b
16c
16d
16e
16g
16h
16i
16j
16
COMPILING UNIT
PROGRAM EXECUTING UNIT
ADDRESS SAVING PROGRAM GENERATOR
ADDRESS SETTING PROGRAM GENERATOR
TRANSFERRING PROGRAM GENERATOR
ADDRESS RESETTING PROGRAM GENERATOR
ACCESSING PROGRAM GENERATOR
IDENTIFICATION-NUMBER DESIGNATING PROGRAM GENERATOR
TABLE PREPARING PROGRAM GENERATOR
IDENTIFICATION-NUMBER OBTAINING PROGRAM GENERATOR
LEADING-ADDRESS OBTAINING PROGRAM GENERATOR

FIG. 18

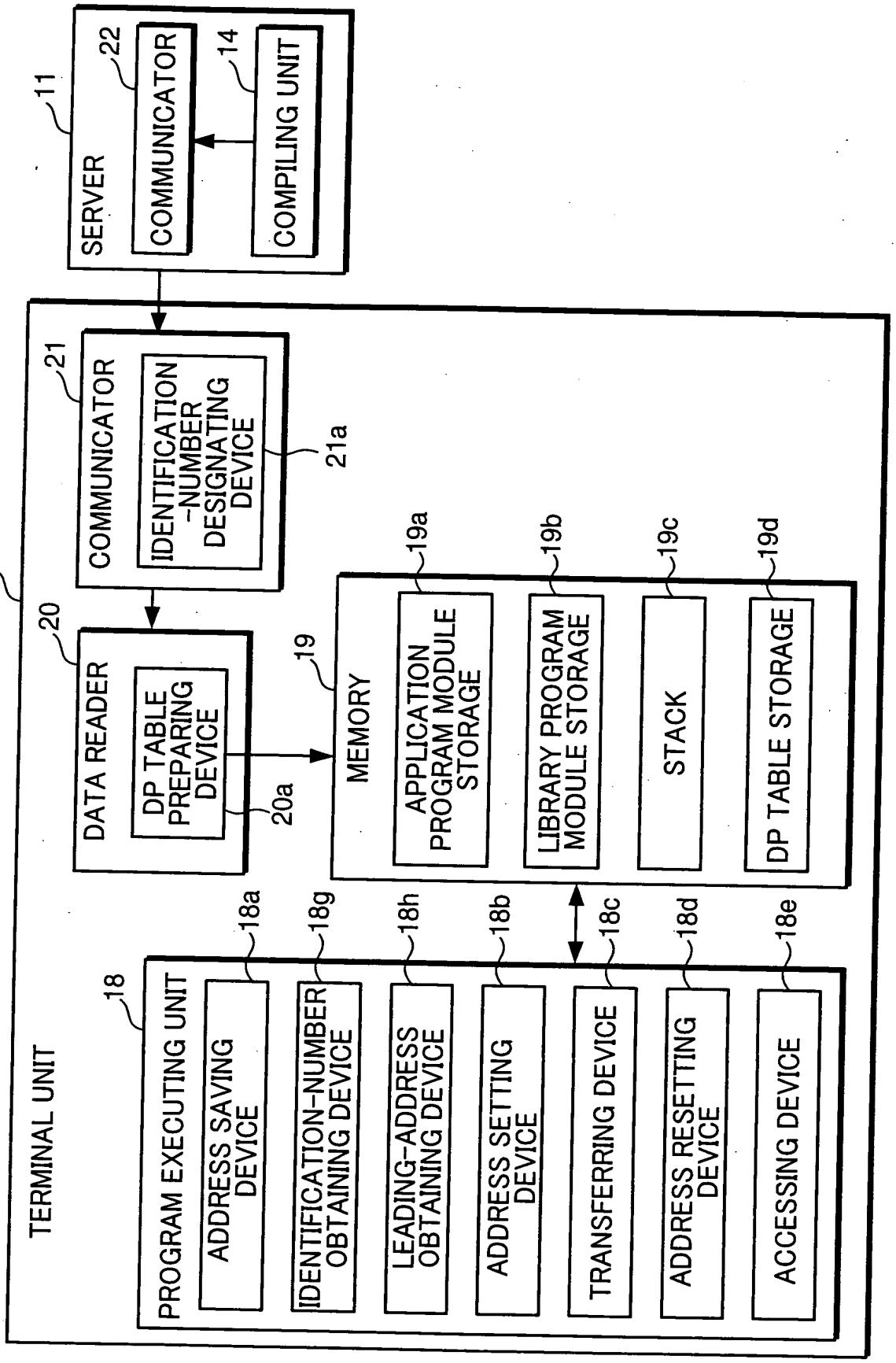

SERVER
11
COMMUNICATOR
22
COMPILING UNIT
14
TERMINAL UNIT
12
COMMUNICATOR
21
IDENTIFICATION -NUMBER DESIGNATING DEVICE
21a
DATA READER
20
DP TABLE PREPARING DEVICE
20a
MEMORY
19
APPLICATION PROGRAM MODULE STORAGE
19a
LIBRARY PROGRAM MODULE STORAGE
19b
STACK
19c
DP TABLE STORAGE
19d
PROGRAM EXECUTING UNIT
18
ADDRESS SAVING DEVICE
18a
IDENTIFICATION-NUMBER OBTAINING DEVICE
18g
LEADING-ADDRESS OBTAINING DEVICE
18h
ADDRESS SETTING DEVICE
18b
TRANSFERRING DEVICE
18c
ADDRESS RESETTING DEVICE
18d
ACCESSING DEVICE
18e

FIG. 19

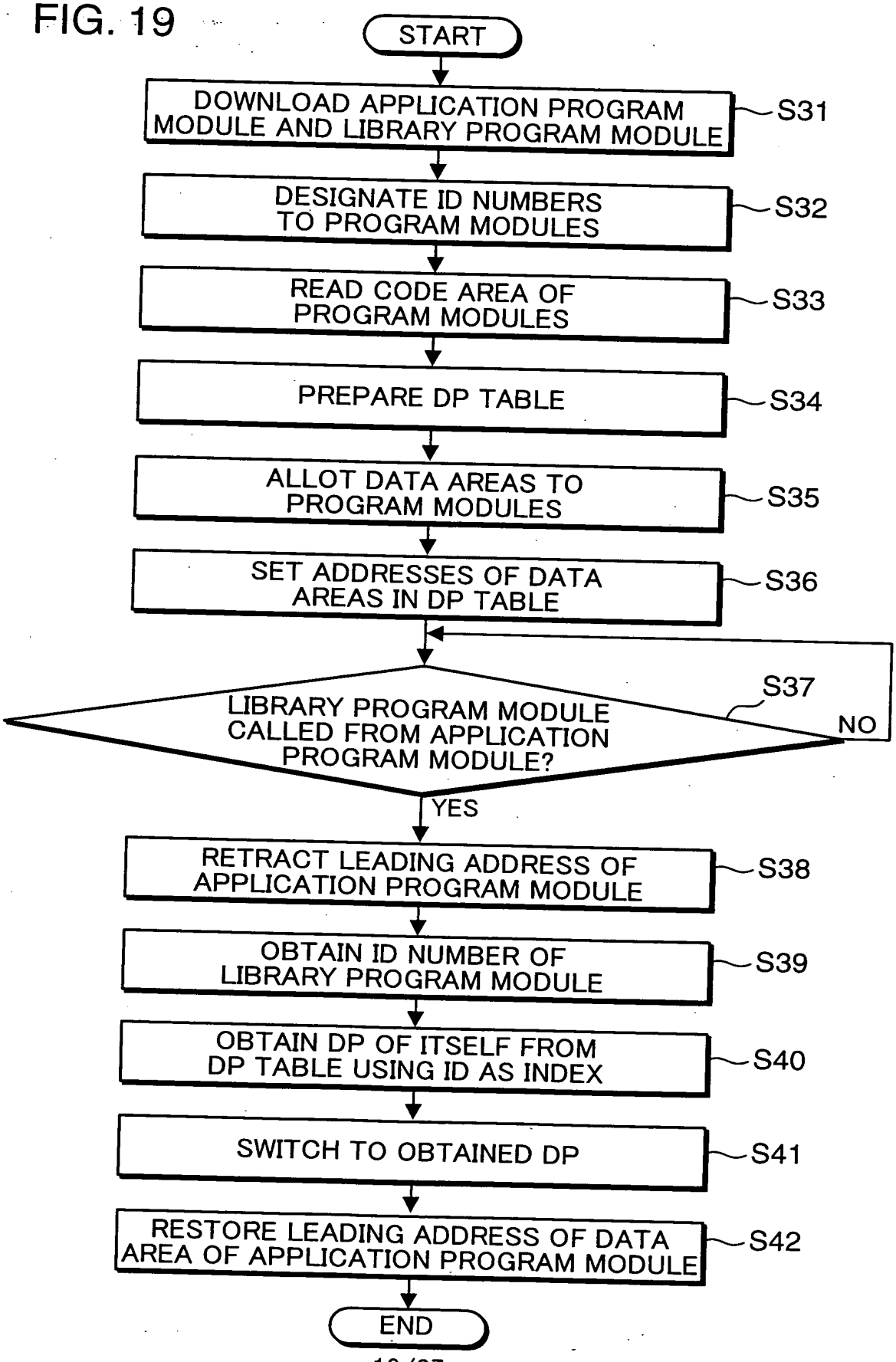

START
DOWNLOAD APPLICATION PROGRAM MODULE AND LIBRARY PROGRAM MODULE
S31
DESIGNATE ID NUMBERS TO PROGRAM MODULES
S32
READ CODE AREA OF PROGRAM MODULES
S33
PREPARE DP TABLE
S34
ALLOT DATA AREAS TO PROGRAM MODULES
S35
SET ADDRESSES OF DATA AREAS IN DP TABLE
S36
LIBRARY PROGRAM MODULE CALLED FROM APPLICATION PROGRAM MODULE?
S37
NO
YES
RETRACT LEADING ADDRESS OF APPLICATION PROGRAM MODULE
S38
OBTAIN ID NUMBER OF LIBRARY PROGRAM MODULE
S39
OBTAIN DP OF ITSELF FROM DP TABLE USING ID AS INDEX
S40
SWITCH TO OBTAINED DP
S41
RESTORE LEADING ADDRESS OF DATA AREA OF APPLICATION PROGRAM MODULE
S42
END

FIG. 20

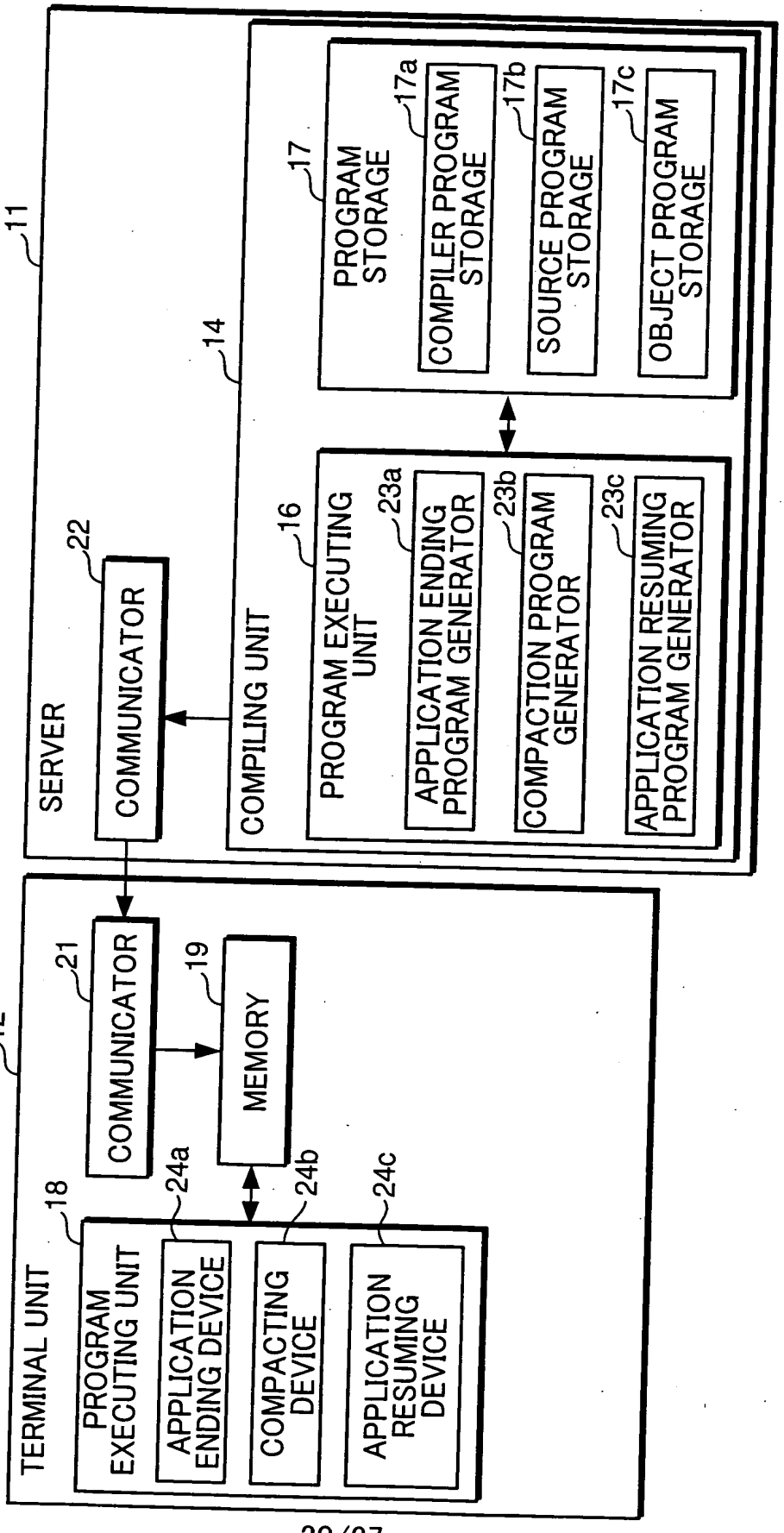

11
SERVER
22
COMMUNICATOR
14
COMPILING UNIT
16
PROGRAM EXECUTING UNIT
23a
APPLICATION ENDING PROGRAM GENERATOR
23b
COMPACTION PROGRAM GENERATOR
23c
APPLICATION RESUMING PROGRAM GENERATOR
17
PROGRAM STORAGE
17a
COMPILER PROGRAM STORAGE
17b
SOURCE PROGRAM STORAGE
17c
OBJECT PROGRAM STORAGE
12
TERMINAL UNIT
21
COMMUNICATOR
19
MEMORY
18
PROGRAM EXECUTING UNIT
24a
APPLICATION ENDING DEVICE
24b
COMPACTING DEVICE
24c
APPLICATION RESUMING DEVICE

FIG. 21

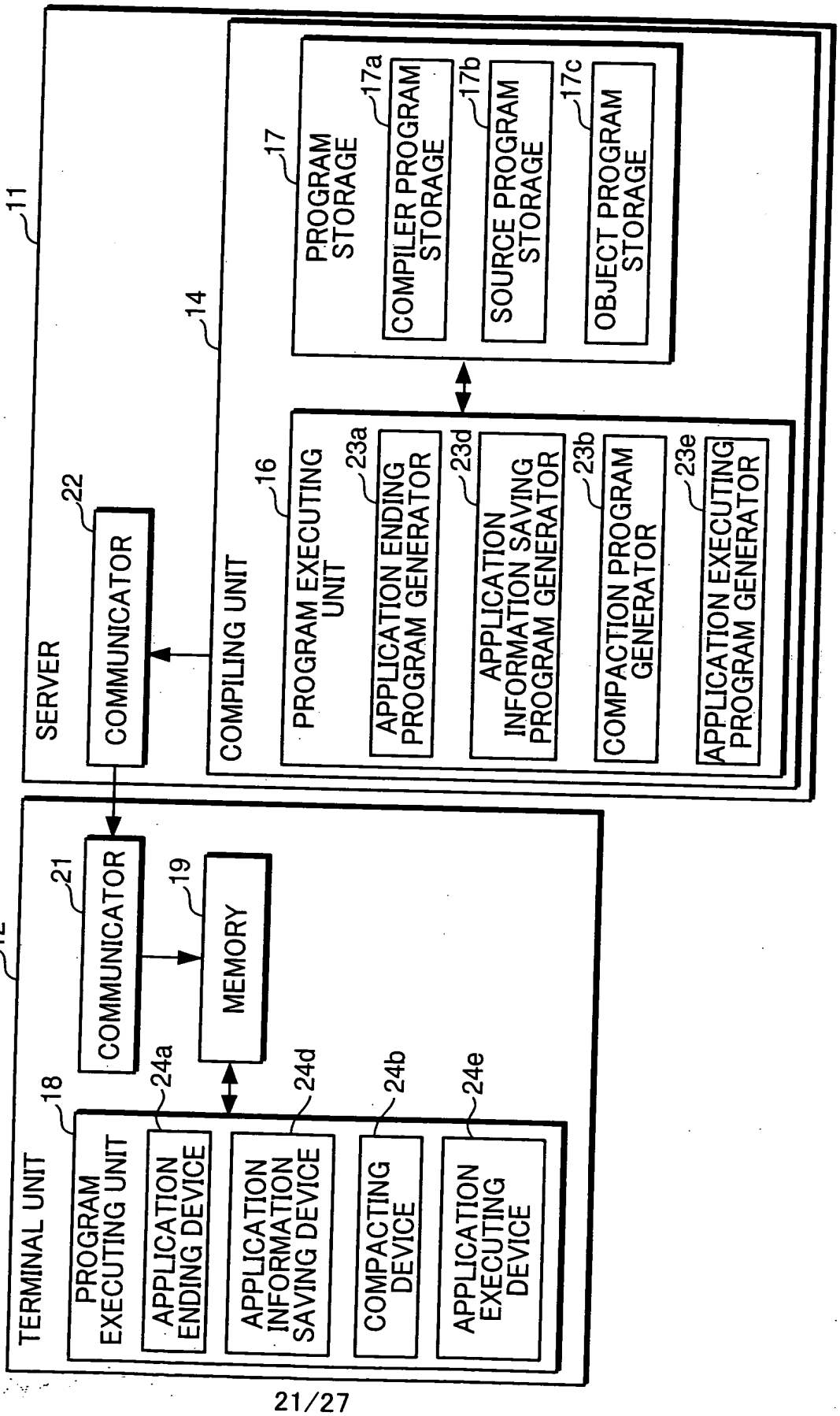

11
SERVER
22
COMMUNICATOR
14
COMPILING UNIT
16
PROGRAM EXECUTING UNIT
23a
APPLICATION ENDING PROGRAM GENERATOR
23d
APPLICATION INFORMATION SAVING PROGRAM GENERATOR
23b
COMPACTION PROGRAM GENERATOR
23e
APPLICATION EXECUTING PROGRAM GENERATOR
17
PROGRAM STORAGE
17a
COMPILER PROGRAM STORAGE
17b
SOURCE PROGRAM STORAGE
17c
OBJECT PROGRAM STORAGE
12
TERMINAL UNIT
21
COMMUNICATOR
19
MEMORY
18
PROGRAM EXECUTING UNIT
24a
APPLICATION ENDING DEVICE
24d
APPLICATION INFORMATION SAVING DEVICE
24b
COMPACTING DEVICE
24e
APPLICATION EXECUTING DEVICE

FIG. 22

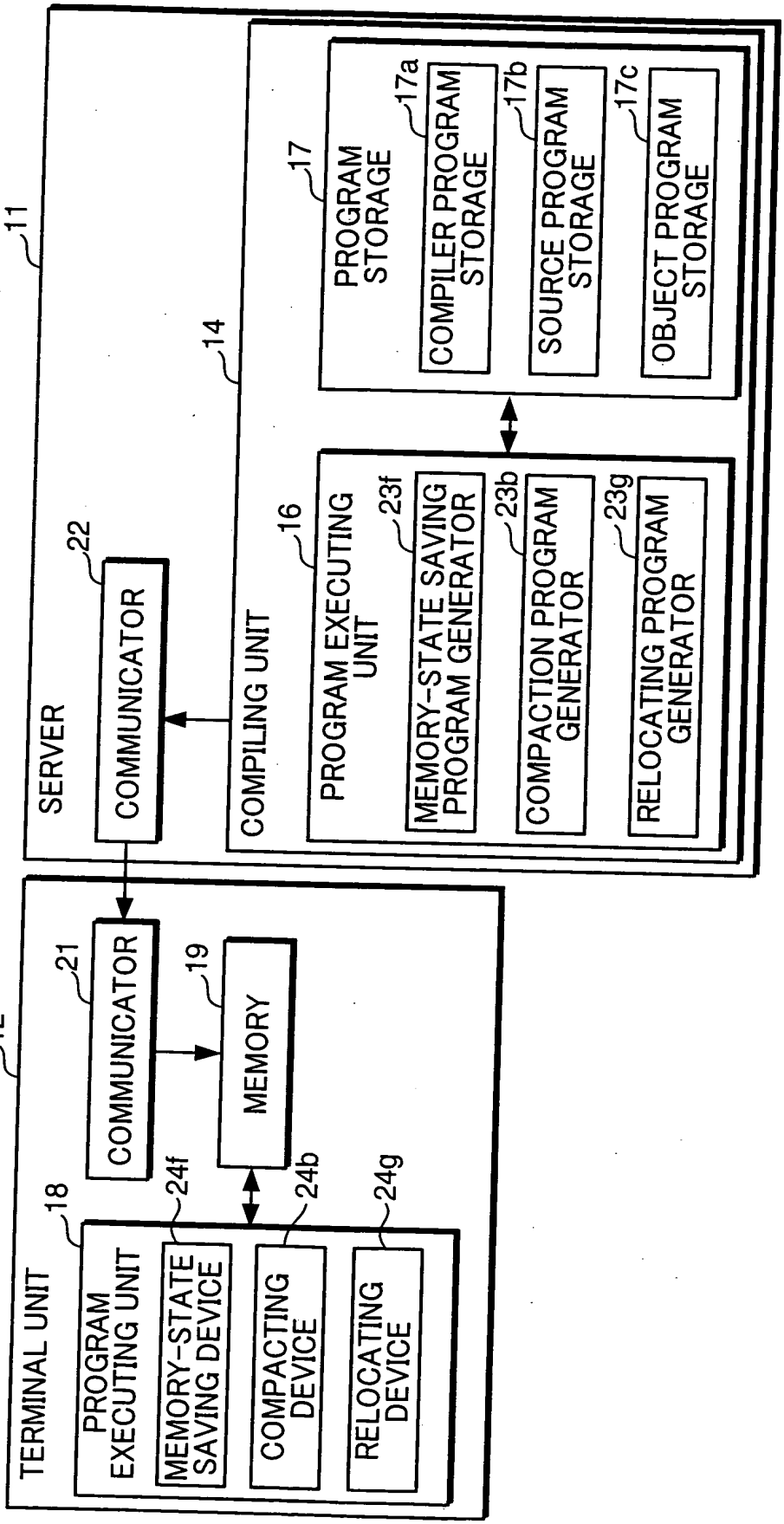

11
SERVER
22
COMMUNICATOR
14
COMPILING UNIT
16
PROGRAM EXECUTING UNIT
23f
MEMORY-STATE SAVING PROGRAM GENERATOR
23b
COMPACTION PROGRAM GENERATOR
23g
RELOCATING PROGRAM GENERATOR
17
PROGRAM STORAGE
17a
COMPILER PROGRAM STORAGE
17b
SOURCE PROGRAM STORAGE
17c
OBJECT PROGRAM STORAGE
12
TERMINAL UNIT
21
COMMUNICATOR
19
MEMORY
18
PROGRAM EXECUTING UNIT
24f
MEMORY-STATE SAVING DEVICE
24b
COMPACTING DEVICE
24g
RELOCATING DEVICE

FIG. 23C

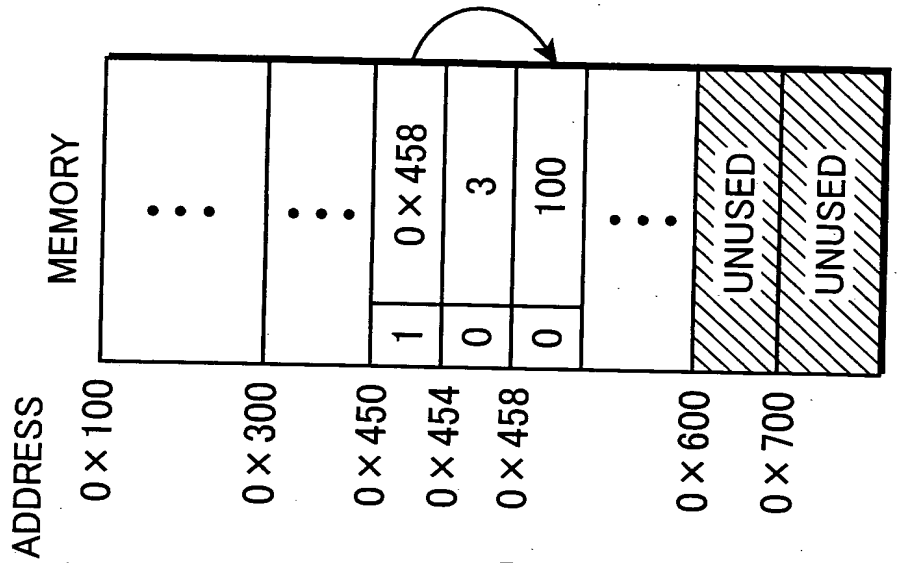


FIG. 23B

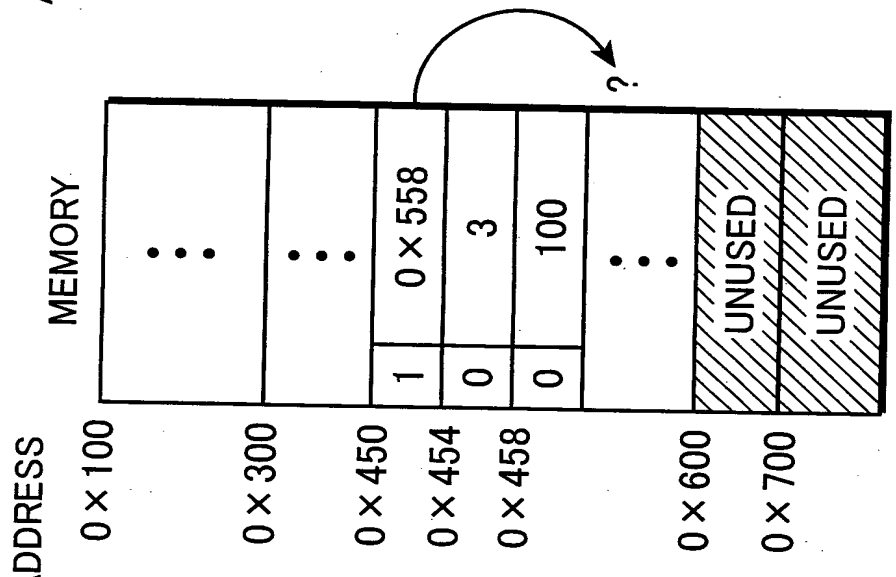


FIG. 23A

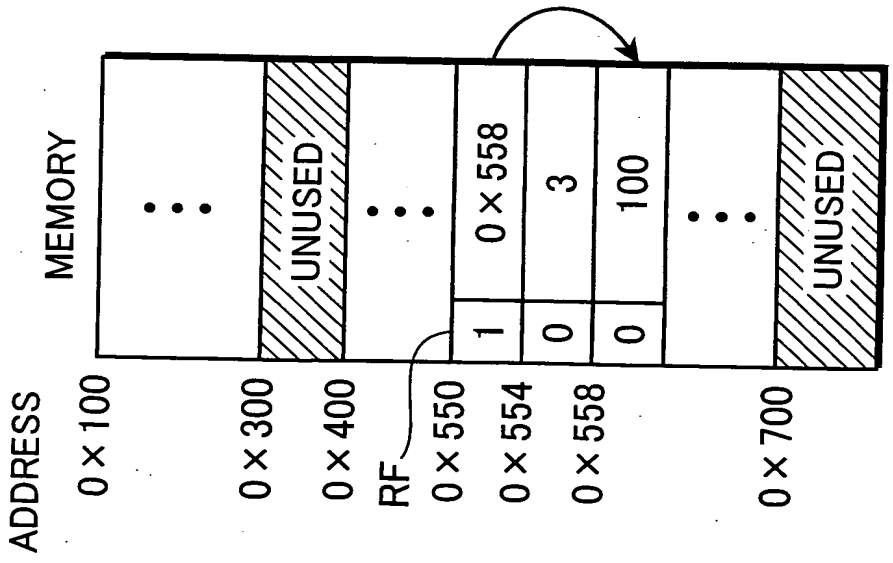


FIG. 24

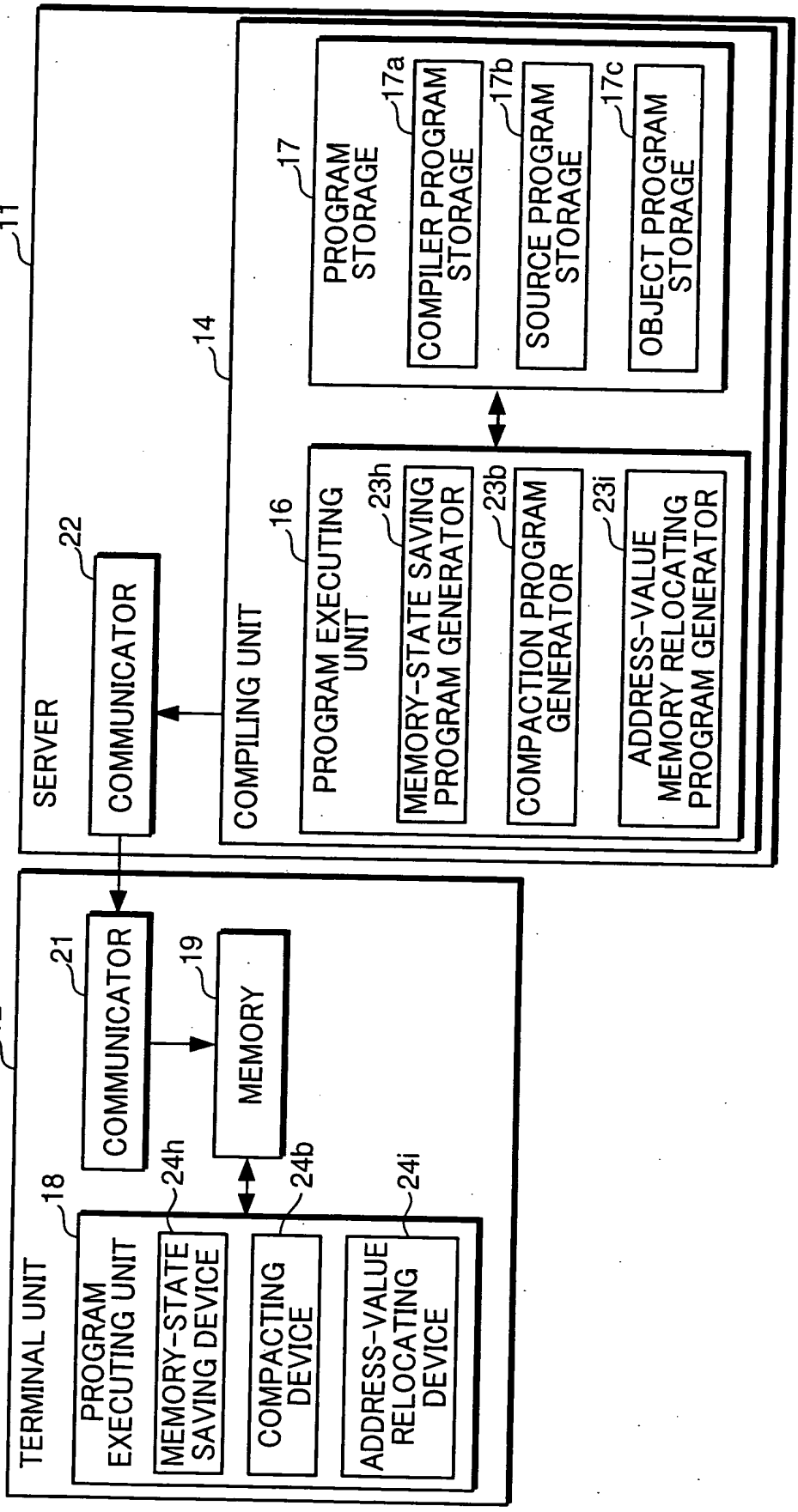

11
SERVER
22
COMMUNICATOR
14
COMPILING UNIT
16
PROGRAM EXECUTING UNIT
17
PROGRAM STORAGE
17a
COMPILER PROGRAM STORAGE
17b
SOURCE PROGRAM STORAGE
17c
OBJECT PROGRAM STORAGE
23h
MEMORY-STATE SAVING PROGRAM GENERATOR
23b
COMPACTION PROGRAM GENERATOR
23i
ADDRESS-VALUE MEMORY RELOCATING PROGRAM GENERATOR
12
TERMINAL UNIT
21
COMMUNICATOR
19
MEMORY
18
PROGRAM EXECUTING UNIT
24h
MEMORY-STATE SAVING DEVICE
24b
COMPACTING DEVICE
24i
ADDRESS-VALUE RELOCATING DEVICE

FIG. 25C

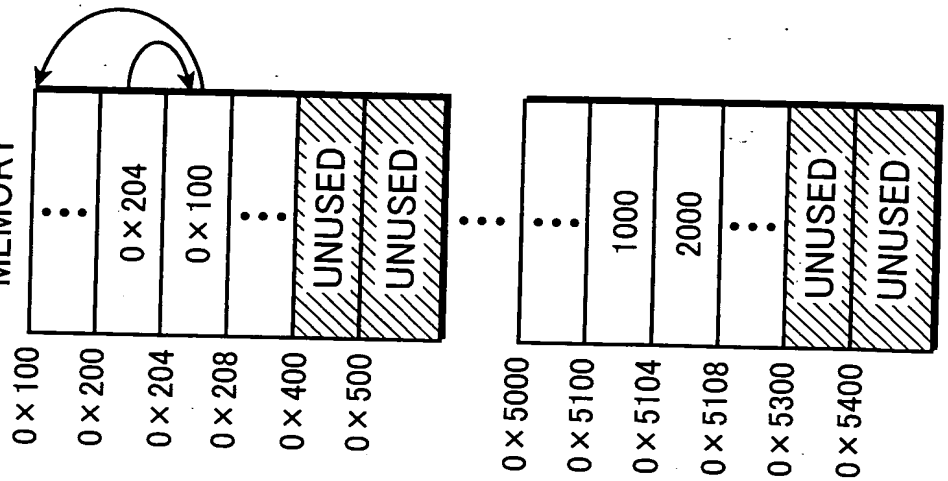


FIG. 25B

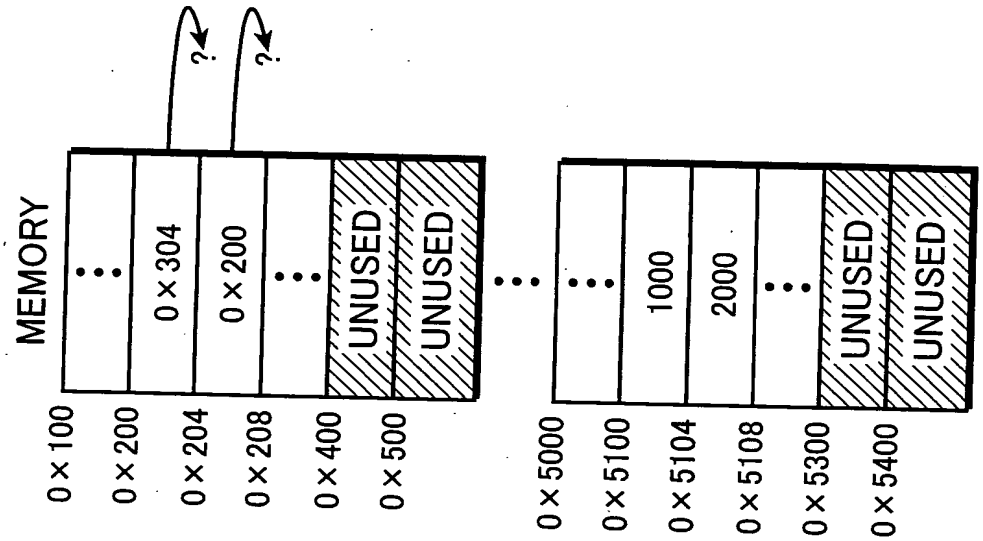


FIG. 25A

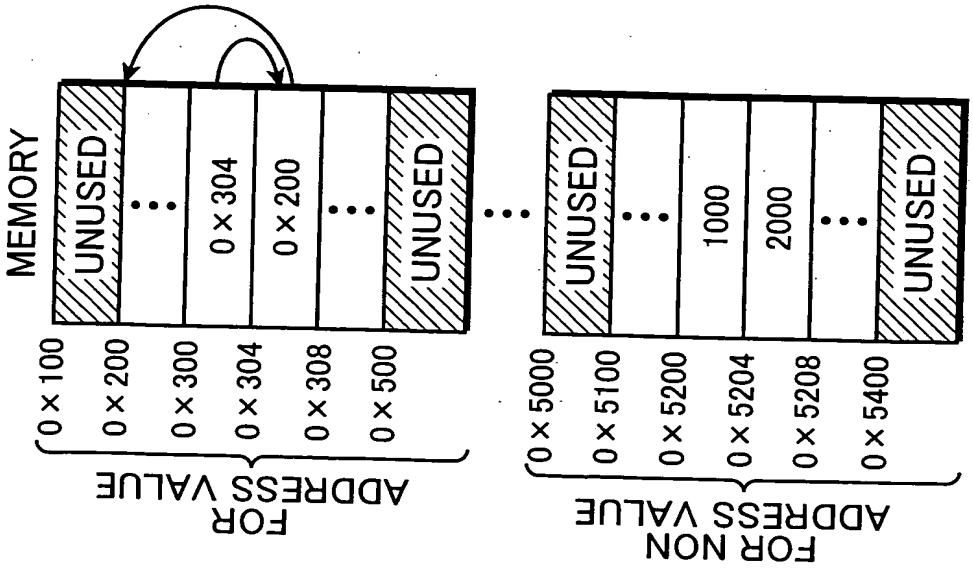


FIG. 26

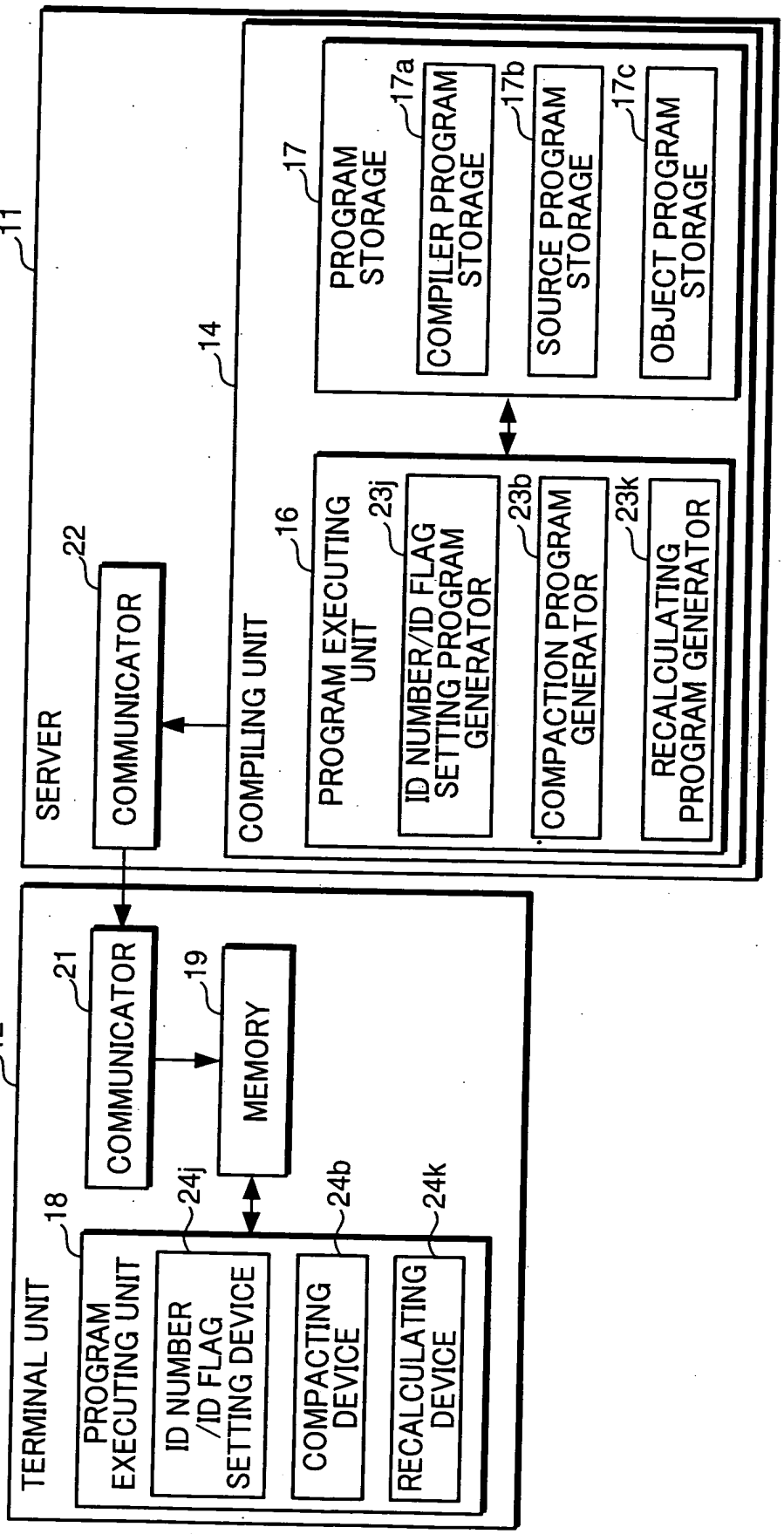
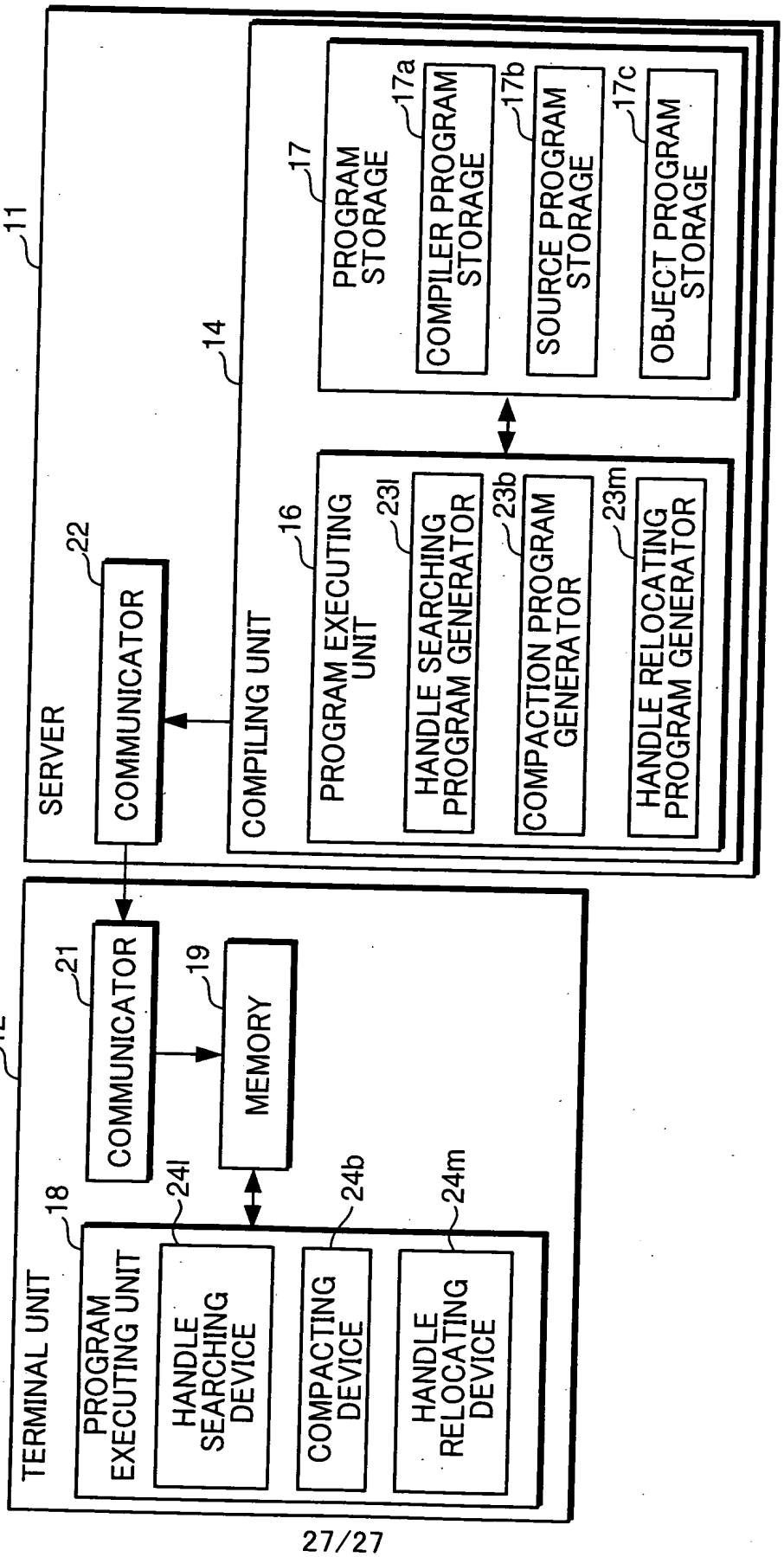

11
SERVER
22
COMMUNICATOR
14
COMPILING UNIT
17
PROGRAM STORAGE
17a
COMPILER PROGRAM STORAGE
17b
SOURCE PROGRAM STORAGE
17c
OBJECT PROGRAM STORAGE
16
PROGRAM EXECUTING UNIT
23j
ID NUMBER/ID FLAG SETTING PROGRAM GENERATOR
23b
COMPACTION PROGRAM GENERATOR
23k
RECALCULATING PROGRAM GENERATOR
12
TERMINAL UNIT
21
COMMUNICATOR
19
MEMORY
18
PROGRAM EXECUTING UNIT
24j
ID NUMBER /ID FLAG SETTING DEVICE
24b
COMPACTING DEVICE
24k
RECALCULATING DEVICE

FIG. 27


11
SERVER
22
COMMUNICATOR
14
COMPILING UNIT
17
PROGRAM STORAGE
17a
COMPILER PROGRAM STORAGE
17b
SOURCE PROGRAM STORAGE
17c
OBJECT PROGRAM STORAGE
16
PROGRAM EXECUTING UNIT
23l
HANDLE SEARCHING PROGRAM GENERATOR
23b
COMPACTION PROGRAM GENERATOR
23m
HANDLE RELOCATING PROGRAM GENERATOR
12
TERMINAL UNIT
21
COMMUNICATOR
19
MEMORY
18
PROGRAM EXECUTING UNIT
24l
HANDLE SEARCHING DEVICE
24b
COMPACTING DEVICE
24m
HANDLE RELOCATING DEVICE